*Updated November 2019*

Founded in 1867, the University of Illinois at Urbana-Champaign (Illinois) is a public land-grant university—it is one of the original 37 public land-grant institutions—and among the nation’s most prominent research institutions. As a land grant institution, the University has a long record of commitment to public engagement and to the discovery and application of knowledge to improve and serve the greater society in which we live. As a world-class teaching and research institution, the UIUC campus provides vast resources to support the activities proposed.

Campus size is 1,783 acres. It serves about 47,000 students (approximately, 34,000 undergraduates and 14,000 graduate students), and employs approximately 1900 tenure and tenure-track faculty, 675 post-docs and specialized faculty, 2000 academic professionals and 1300 Civil Service staff. The students at Illinois represent 50 states in the US, and 100+ countries (<https://blogs.illinois.edu/view/7523/521551>).

The university offers 5,000+ courses in 150+ programs of study offered by 15 colleges and schools. About 75% or more of America's Fortune 100 companies (including 8 of the top 10) recruit on campus, and more than 5,700 companies recruited on campus in 2017-2018.

An eminent STEM education and research hub, Illinois’ ranking in the U.S. News 2020 Best Colleges is 14 among public universities and 48 among national universities (<https://www.usnews.com/best-colleges/university-of-illinois-urbanachampaign-1775/overall-rankings>; <http://illinois.edu/about/rankings.html>). The Academic Ranking of World Universities (ARWU) ranks the University of Illinois as 38th in the World (2019) overall (<http://www.shanghairanking.com/arwu2019.html>); 13th in Engineering/Technology and Computer Sciences (2016); 29th in Life and Agriculture Sciences (2016); 28th in Natural Sciences and Mathematics (2010); and 37th in Social Sciences (2016). In FY17, the University had sponsored research expenditures of $642 million.

The College of Engineering is ranked #6 (U.S. News and World Report). In addition to a strong research program with expenditures of $230M annually, the Academy for Excellence in Engineering Education supports efforts to improve undergraduate education. College laboratory and maker facilities, along with the University of Illinois Research Park, provide opportunities for hands-on education, undergraduate research, internships and entrepreneurship.

The university is ranked 4th nationally on the number of earned doctorates according to the 2018 Survey of Earned Doctorates (<https://ncses.nsf.gov/pubs/nsf19301/data>).

The University of Illinois at Urbana-Champaign boasts a prestigious faculty and successful alumni. Faculty have membership in The American Association for the Advancement of Sciences, American Academy of Arts and Sciences, The National Academy of Sciences, and the National Academy of Engineering; and as recipients of the Nobel Prize, Crafoord Prize in Biosciences, Japan Prize, National Medal of Science, Pulitzer Prize, and Presidential Early Career Awards for Scientists and Engineers, and MacArthur Fellowships; and by such organizations as the National Endowment for the Humanities, Guggenheim Memorial Foundation, National Academy of Education, and the Alfred P. Sloan Foundation.

* Information from <https://provost.illinois.edu/awards/faculty-awards-honors/by-the-numbers/> (accessed May 13, 2018)
	+ 42 faculty are American Academy of Arts & Sciences members.
	+ 146 faculty members from Illinois have been named as Fellows of the American Association for the Advancement of Science.
	+ 66 are Fulbright Scholars
	+ 37 are Guggenheim Fellows
	+ 20 (including current and former faculty and alumni) are MacArthur Fellows (2 are at Illinois currently, one additional faculty is deceased)
	+ 43 faculty have received National Endowment for the Humanities Fellowships. In fact Illinois is #1 in number of faculty members awarded the National Endowment for the Humanities Fellowships, two years in a row (2015 and 2016); more of these awards than any single institution (https://news.illinois.edu/blog/view/6367/295246).
	+ 23 (including current and former faculty and alumni) have won Nobel prizes (13 are faculty and 10 are alumni).

Each year 2000+ study abroad students participate in more than 300 programs and affiliations in more than 45 countries; Illinois is ranked 15th in the nation among all public and private institutions in the United States for number of students earning credit from study abroad.

Illinois is #2 in the nation’s top public institutions welcoming international students (#5 among public and private institutions; <https://international.illinois.edu/global-impact/numbers.html>).

The university is rated as #1 as a "disability friendly" U.S. campus. It developed the first transitional living program for students with physical disabilities needing personal assistant support services. Students with physical disabilities who require personal assistant support services have an 87 percent graduation rate; nearly 60 percent obtain employment within a year of graduation, while another 32 percent enroll in graduate or professional schools.

Women hold 16% (Engineering) to 36% (Science) of tenure-system faculty positions and 32% of executive officer (**EO**) positions. Underrepresented racial/ethnic minority (**URM** -applying NSF definition) women hold 1% (Engineering) to 6% (Science) of faculty positions and 0% to 1% of EO positions. Analysis of data from all 63 Engineering and Science units at Illinois uncovered disparities between genders and race/ethnic groups in promotion and tenure (**P&T**) indicators and leadership prospects. Climate surveys highlight perceptions of gender inequality in job responsibilities and opportunities, and limited champions, role models, and leadership opportunities.

At Illinois, NSF funding is critical to supporting basic research in all disciplines. In fact, for the last six years running, we have been awarded more funding from the National Science Foundation than any other university in the nation. NSF-supported projects have led to such life-changing innovations as the modern internet browser and wearable electronics, along with many other technologies that have formed the basis for dozens of start-up companies.

Illinois engineers, chemists, agronomists, geologists, computer scientists and other researchers are consistently among the nation’s top recipients of Department of Energy funding – and for the

last three years in a row, the university has been among the DOE’s top five funding partners.

Illinois is home to one of the DOE’s premier programs for energy research, the Energy Frontier Research Center. EFRCs accelerate the scientific breakthroughs needed to build the 21st-century

energy economy. There are 36 total EFRC across the nation, and Illinois is involved in five of them. Illinois is also a partner in the JCESR, one of DOE’s high-profile energy innovation hubs.

The university has six cultural centers that offer the entire campus community opportunities to learn about and to experience the rich historic traditions and modern living cultures that shape our world: Asian-American Cultural Center, Bruce D. Nesbitt African-American Cultural Center, La Casa Cultural Latina, Native American House, Women's Resources Center, and LGBT Resource Center.

Illinois has extensive experience managing partnerships and monitoring subcontracts as a lead organization, and the University is structured to provide robust support for large-scale, collaborative, sponsored research. The University annually processes more than 800 subawards, with an approximate cumulative award amount of $125 million (Note: Numbers not yet verified for 2018).

Collaboration and innovation are hallmarks of the Illinois research enterprise. A few examples from the last decade include computing-intensive projects that involve multiple users from the across the nation’s research community, such as the Blue Waters Petascale Supercomputer and Extreme Sciences & Engineering Discovery Environment (XSEDE) projects. Blue Waters in particular presented a noteworthy management challenge when the original vendor had difficulty meeting the terms of the agreement. Ultimately, by drawing on institutional flexibility and resourcefulness, the University was able to identify another partner to achieve the goals of the original proposal.

This creative and committed approach to research administration is part of the University’s culture, at both the unit and the campus level. Individual units have embedded staff to provide hands-on management and administrative support, while campus-level offices provide overarching leadership and ensure compliance with regulatory requirements. The University’s National Center for Supercomputing Applications has more than 30 years of experience managing complex multi-disciplinary, multi-institutional grants. NCSA’s grant management processes and practices include a professionally staffed Project Management Office, with the programmatic and financial management tools and experience to ensuring the large-scale projects are efficiently planned and executed. Notable projects include the above-mentioned Blue Waters project, totaling $440M in combined state & federal support over 8 years, and the XSEDE project, totaling $230M over 10 years.

Additional projects that demonstrate Illinois experience managing awards of this scale include:

* POETS, an NSF-funded Engineering Research Center (an $18.5M award averaging $3.7M per year)
* A DHS funded Critical Infrastructure Resiliency Center to improve the resiliency of critical infrastructure, which includes dams, information technology, emergency services, transportation systems and critical manufacturing ($20 Million).
* Three large-scale Department of Energy awards to address the nation’s energy needs, including an Energy Frontier Research Center, participation in the JCSER initiative, and CABBI, the $100M+ Bioenergy Research Center
* The Enzyme Function Initiative, an NIH GLUE grant renewal of $34.5M for 2015-2020.

### Analysis capacity

The Materials Research Laboratory (MRL) of the UIUC has an extensive list of equipment, such as SEM, TEM, XRD, SIIMC, AES, XPS and XRF for material characterization and trained personnel for operating and testing these facilities. Another related analysis facility is the Microanalysis Laboratory of the UIUC, which provides three major types of services: wet chemistry analysis, elemental analysis and thermal analysis. The trained personnel can also identify and/or develop the analytical approaches for chemical analyses required in this project. All facilities at the MRL and Microanalysis Lab are available for the team members involved in this proposed project.

### Illinois State Geological Survey

The Illinois State Geological Survey (ISGS) is a division of the University of Illinois at Urbana-Champaign (UIUC). The ISGS occupies 51,800 ft2 of office and laboratory space, a 7,200-ft2 coal research facility (Applied Research Lab), a 9,300 ft2 geological records unit (well logs and well records), and a 19,000 ft2 geological samples library on the UIUC campus in Champaign, Illinois. The proposed research work will be conducted in the Applied Research Lab building of the ISSG. Two 355–ft2 labs with the hood/ventilation systems and with full availability of utilities, including water, compressed and atmospheric air, vacuum, natural gas, will be available to host the experimental systems for this study. In this building, other laboratories such as for regular wet chemistry analysis, thermal analysis, material characterization, and material crushing and grinding, are open for the team members to use. The resources of the ISGS’ other units, such as the geochemistry, bio-geochemistry and instrumental analysis laboratories can also be accessed, if necessary.

The ISGS has a well-equipped machine shop. If the laboratory is required to be renovated or equipment is to be built in this project, the machine shop can help in the design and manufacturing. They also provide the service for installing any experimental system if required in this project.

The ISGS has professional employees to provide many other relevant services. For example, IT supportive professionals are responsible for maintaining the computer network, databases and personal computers. The editing and graphics professionals provide services of technical editing, writing, design, illus­tration, typesetting and photography, pro­duction of camera-ready publications, slides, posters and exhibits.

### Illinois Sustainable Technology Center

The Illinois Sustainable Technology Center (ISTC) is a division of the Prairie Research Institute at the UIUC. ISTC is a non-regulatory agency that **integrates** applied research, technical assistance, and information services to advance efforts in the areas of pollution prevention; water and energy conservation; and materials recycling and beneficial reuse. The mission of the ISTC is to encourage and assist citizens, businesses, and government agencies to prevent pollution, conserve natural resources, and reduce waste to protect human health and the environment. We provide this knowledge to the general public, businesses, state agencies, and the scientific community to improve the environment and economic viability of Illinois, the nation, and the world. ISTC maintains both analytical and process laboratories to support research conducted by ISTC staff. The laboratory facilities are well equipped for process development, chemical analysis, and environmental systems research. ISTC comprises over 20,000 sq.ft of specialized research space equipped with state-of-art instrumentation, explosion-proof pilot facilities, and high hazard laboratory space dedicated to research and development. In addition to University of Illinois science, engineering, and agriculture libraries, ISTC has a degreed librarian to assist with literature searching and research. Also, the ISTC hosts a year-long series of Sustainability Seminars, which provide an opportunity to share scientific research with University faculty, staff, extension scientists, students, farmers, and stakeholders. All facilities and resources at the ISTC will be available for this project at no additional cost.

 In addition, the investigators also have access to the core facilities at the University of Illinois such as the Center for Microanalysis, the Imaging Technology Group, and the Materials Research Laboratory, among others. For example, the School of Chemical Sciences at UIUC maintains technician-operated analytical facilities that are available at a nominal cost (scs.illinois.edu/facilities.php). As necessary, the investigators have access to several highly advanced mass spectrometers (e.g., ion trap MS/MS, MALDI TOF, and tandem quadrupole/TOF HR instruments) in this project to identify the degradation products of the selected biphasic solvents. Since the investigators are University employees, all facilities and resources at the UIUC necessary to complete the proposed work are available to the PIs.

### National Center for Supercomputing Applications (NCSA)

The National Center for Supercomputing Applications (NCSA) , established at Illinois in 1986, a high-performance facility located on the University of Illinois campus, provides integrated cyberinfrastructure—computing, data, networking, and visualization resources and expertise—that are essential to the work of scientists, engineers, and scholars at Illinois and across the country. NCSA supports user communities by offering many resources that are the foundations of advanced cyberinfrastructure.

The total computational resources at NCSA exceed 43 TF supported by over 1 PB of disk storage as part of the infrastructure. The systems are on an internal 10GbE network. Mass storage currently consists of 2 SGI Origin 3900 servers running EMC/Legato DiskExtender (UniTree) with 35 TB of SAN disk cache, 38 LTO2 tape drives, 6 IBM3590 tape drives, and 2 ADIC libraries. The total archival storage capacity of this environment is 3 PB. There is also 284 TB of SAN connected storage for infrastructure and special projects. All computing platforms are interconnected to a multi-10gigabit network core. The NCSA high-performance computing environment has access to the Abilene high-performance network through a shared 10-gigabit-per-second connection. NCSA also is one of the leading sites for I-WIRE, an optical networking project funded by the state of Illinois. I-WIRE provides lambda services for several projects, including NCSA's 30-gigabit-per-second connection to the TeraGrid network.

##### *Blue Waters*.

The Blue Waters supercomputer is a petascale system providing unprecedented, highly productive resources and services for computational and data intensive science. It is designed for maximum throughput on very large-scale, complex applications. Blue Waters is a Cray XE/XK hybrid machine composed of AMD 6276 Interlagos processors (nominal clock speed of at least 2.3 GHz) and NVIDIA GK110 (K20X) Kepler accelerators all connected by the Cray Gemini torus interconnect. The system has a peak speed of 13.1 PF, 1.66 PB of memory, 26 PB of user accessible online storage, 300 PB of usable near-line storage and 400 Gbps in external networking capability, and achieves real, sustained petascale performance on multiple real science problems averaging 1.3 PF/s. The supercomputer is located in a 20,000 ft2 machine room at the National Petascale Computing Facility (NPCF) on the western edge of the Illinois campus. NPCF earned a gold certification from the U.S. Green Building Council's Leadership in Energy and Environmental Design (LEED) for its sustainable design. Researchers across the US can apply for an allocation through the NSF Petascale Computing Resource Allocation (PRAC) program; a percentage of Blue Waters time is reserved for Illinois researchers, who can also apply for allocations through an internal applications process at University of Illinois.

##### *NCSA Materials Data Facility*.

The Materials Data Facility (MDF), funded by NIST as the first pilot community of the National Data Service and managed by NCSA at Illinois, is a set of data services built to support materials science researchers. MDF is a cloud-based open-source repository of experimental and computational materials science data that materials scientists can publish, store, and share research data.

***Campus Cluster.*** The Campus Cluster is a powerful shared computing system on the UIUC campus. Individuals, groups, and campus units can invest in compute and storage resources on the cluster or pay a fee for on-demand use of compute cycles. The campus cluster is housed at the Advanced Computation Building, a facility specially designed to support high-performance computing systems, and administered by NCSA. Those who invest in compute resources on the cluster have guaranteed access to the number and type of nodes in which they invested. When any owner is not using his or her share, any other user may take advantage of the surplus. In this way, researchers get more computing capacity for their money than they would by building many separate systems across campus. Pooling computer resources also helps researchers control expenses and reduce overhead, shorten startup time, avoid space renovation and free up space formerly used for separate cluster resources, and reduce the campus carbon footprint.

Campus Cluster resources include the Golub and Taub clusters:

**Golub:** The Golub cluster is designed to support up to 512 nodes with FDR InfiniBand for applications communications and data transport with a gigabit Ethernet control network. The disk system was selected to support expandability and the GPFS file system. Golub has 312 Compute nodes (Dell C8220 compute sleds) each with: 2 Intel E5-2670V2 (Ivy Bridge) 2.50 GHz, 25MB cache, 10C, 115 W; 64/128/256 GB RAM (at customer's choice); 2 1 TB, 7200 RPM, SATA, 3 Gbps, 2.5" HDD; and Intel Ethernet controller i350.

**Taub:** The infrastructure of the Taub cluster is designed to support up to 512 nodes with QDR InfiniBand for applications communications and data transport with a gigabit Ethernet control network. The disk system was selected to support expandability and the GPFS file system. Taub has 512 Compute nodes—HP SL390G7 1U servers each configured with: (2) Intel HP X5650 2.66 GHz 6-core processors, 95 W; 12/24/48/96 GB RAM (at customer's choice); HP 160 GB or 500 GB 3G SATA 7200 RPM 3.5" QR ETY HDD; HP IB enablement kit.

### UI Library System

The University of Illinois library provides exceptional resources for advanced study and research. The collection includes 11.3 million items, making the library the third largest among U.S. university libraries (and first among state universities). Most materials are housed in the main library and in 35 departmental libraries located on campus. The UI library also maintains and operates the Illinois Data Bank public access repository on behalf of UI and provides the Illinois research community with expertise and tools to manage and steward research data through the Research Data Service and its experts.

### NSF

Notable NSF-supported projects at Illinois:

*Infrastructure for the nation’s research community*

* Blue Waters, the world’s fastest supercomputer on an academic campus. It has helped users from across the country to detect gravitational waves, design the first set of antibody prototypes to detect the Ebola virus, and develop simulations that could potentially lead to new HIV therapies.
* XSEDE unites experts and cyberinfrastructure resources across the country to assist digital research at all levels.
* CompGen, a Major Research Instrumentation award, enables the management and processing of genomic information and the development of new algorithms to facilitate the analysis of genomic data.

*Illinois scientists are conducting research to address the grand challenges of our time:*

* Addressing the thermal and electrical challenges surrounding mobile electronics and vehicle design, as a single system (POETS, an Engineering Research Center)
* Building living, multi-cellular machines to solve environmental, health, and security problems (EBICS)
* Revolutionizing the Bioengineering curriculum at Illinois to ensure that student education is driven by a single principle: “No solution without a need.” (RED, ‘REvolutionizing’ engineering and computer science Departments).

### DOE

Notable DOE-supported projects at Illinois:

*Ensuring the Reliability and Security of the Nation’s Power Grid*

* The Cyber Resilient Energy Delivery Consortium, which works toward ensuring the resiliency of energy delivery systems during attacks on infrastructure or related disruptive events.
* Cyber-Physical Modeling and Analysis for a Smart and Resilient Grid is an ARPA-E project which explores new grid security techniques and tools that address cyber and physical threats.

*Developing Tools and Techniques to Enable Bioenergy Solutions*

* PETROSS (Plants Engineered to Replace Oil in Sugarcane and Sorghum) is an ARPA-E project aimed at transforming sugarcane and sweet sorghum to naturally produce large amounts of oil, a sustainable source of biofuel.

### Animal Facilities at UIUC:

The UIUC Animal Facilities are located at various facilities but have centralized management. The Laboratory Animal Program is AAALAC International approved. Current space allocation for this project is in the dedicated animal care facility of Morrill Hall and Beckman Institute. Access to this area is by key swipe card to the corridor and hard key to the room. This room is equipped with door sweeps to prevent rodent entry or escape. Rodent housing consists of either static micro-isolator cage systems or Individually Ventilated Cage (IVC) systems. Rodents are initially received from approved vendors or are verified clean in the campus Rodent Quarantine Facility. The dedicated ABLII animal housing room has an adjacent procedure room equipped with a Biosafety Cabinet and a Cage Dumping Station. Veterinary support is available twenty-four hours a day, seven days a week, year-round. The animal care is maintained by well-trained staff from Division of Animal Resources. Facilities are maintained by campus service personnel or contractors. Protocols are managed by the Institutional Animal Care and Use Committee (IACUC) of UIUC.

### Center for Teaching Excellence (CTE)

Since 1964, the Center for Teaching Excellence (CTE) (www.cte.illinois.edu) has been dedicated to the support, promotion, and enhancement of teaching and learning at the University of Illinois at Urbana-Champaign. The Center offers an array of campus-wicde services to faculty, academic units, and teaching assistants that promote integration of new ideas and effective pedagogy into courses, programs, and curricula encourage and support both scholarly teaching and the scholarship of teaching and learning develop, implement, and assist instructional approaches and methods provide opportunities for ongoing discussion about teaching and learning cultivate an institutional climate that values, rewards, and renews teaching excellence.

### Center for Nanoscale Science and Technology (CNST)

The University of Illinois Center for Nanoscale Science and Technology (CNST) collaboratory, is the overarching umbrella center for nanotechnology research, education and training, entrepreneurship, and outreach activities. It has experience in nurturing the previously funded nanoBIO Node, and several other federally-funded multidisciplinary centers and projects, including NSF-funded Industry/University Cooperative Research Centers (I/UCRCs), Nanotechnology Engineering Research Center (NERC), Science and Technology Centers (STCs), and others from the NIH/NCI, DOD, USAID, and others. The CNST works as a collaboratory involving the Micro and Nanotechnology Laboratory (MNTL), the Frederick Seitz Materials Research Laboratory (FSMRL), and the Micro-Nano-Mechanical Manufacturing Systems Laboratory (MNMS).

### Illinois Leadership Center

The Illinois Leadership Center is a partnership between Academic Affairs and Student Affairs to provide a comprehensive leadership education program for students at Illinois. The Center is committed to developing and enhancing the leadership skills of all students through assessment, learning, and experiential opportunities. In addition, the Center supports faculty and staff who are pursuing leadership-related teaching, research, and student engagement activities.

The Illinois Leadership Center has developed a series of "I-programs", which are day-long workshops that focus on a particular aspect of leadership practice. These workshops include "Intersect" (interpersonal communication and team building), "Ignite" (effective group and organization development), "Integrity" (interpersonal and organizational ethical leadership), "Inclusion" (equity, equality, diversity, inclusion, and bias), "Innovation" (innovation, creativity, and diversity of ideas in problem solving), and "Imprint" (leadership in times of personal and professional transition). The Illinois Leadership Center also offers 60-minute workshops on topics such as identifying individual strengths, communication skills, teamwork, strategic planning, motivation, and conflict resolution, as well as workshops featuring Illinois alumni who share experiences, offer advice, and provide perspective on leadership experiences.