We’re a big campus — **Big 10**, to be exact — with **$700 million** spent on research and development in a typical year. We have **15 schools and colleges**, including our internationally known College of Engineering, where the Department of Computer Science resides. This substantial breadth offers many opportunities for CS graduate students to conduct collaborative groundbreaking research that can impact not only computing but medicine, business, the arts, media, or whatever defines your research and passion. **Together we can do the impossible every day.**

**ILLINOIS COMPUTER SCIENCE OFFERS...**

- A dynamic and stimulating research culture with 100 potential faculty advisors, covering 10 research areas and every sub-area in between.

- A top-five CS graduate program and top-ranked programs on campus in computer engineering, information science, physics, psychology, and engineering.

- Flexible programs of study enabling graduate students to craft a learning experience that best fits their passions, interests, and goals.

- A culture of collaboration where the best minds tackle a myriad of 21st-century problems by developing cutting-edge data science techniques and harnessing the power of petascale computing.

- Thousands of creative and driven alumni who are entrepreneurs, educators, and technical visionaries. Companies who have been founded or led by Illinois Computer Science graduates are among the biggest names in the high-tech arena, including C3 IoT, Match.com, Microsoft, Netscape, PayPal, YouTube, and Yelp.

**FACTS & FIGURES**

- 80 Faculty
- 1,016 Graduate Students
- 1,713 Undergraduate Students
- 11,500 Alumni
- **$34.8 Million** in Research Expenditures in 2017

Birthplace of Mosaic, the World’s First Popular Web Browser, and the LLVM Compiler Infrastructure

University of Illinois is #2 in NSF Funding

College of Engineering

- Ranked #13 in Academic Rankings of World Universities in Engineering

ILLINOIS CS ranked #5 in the U.S. News & World Report Graduate School Rankings

- Ranked #22 in Academic Rankings of World Universities in Computer Science & Engineering
The demand for computer science education has exploded because computing underpins just about every aspect of modern life. The arts, science, business, medicine, and engineering all benefit from the computational power, modeling, and thinking found in computer science. Our students and faculty are bringing their expertise to bear on many of society’s most challenging problems. Illinois Computer Science has a global reputation for developing revolutionary technology—where groundbreaking research addresses real-world problems.

**EARN A PREMIER CS GRADUATE DEGREE FROM A TOP-5 PROGRAM WITH RESEARCH IN:**

- Architecture, Compilers, and Parallel Computing
- Artificial Intelligence
- Bioinformatics and Computational Biology
- Computers and Education
- Database and Information Systems
- Graphics, Visualization, and Human-Computer Interaction
- Programming Languages, Formal Methods, and Software Engineering
- Scientific Computing
- Systems and Networking
- Theory and Algorithms

**WORLD-CLASS FACULTY**

Learn from and work with some of the best CS faculty in the world. Our **80 INTERNATIONALLY RECOGNIZED FACULTY** include 15 ACM Fellows, 15 IEEE Fellows, 8 Sloan Research Fellows, and 32 NSF CAREER Award winners. And our faculty generated $34.8 million in research expenditures in 2017.
As we approach the end of Moore’s Law, and as mobile devices and cloud computing become pervasive, all aspects of system design—circuits, processors, memory, compilers, programming environments—must become more energy efficient, resilient, and programmable.

Our research groups explore energy efficiency via low-voltage design techniques, specialized hardware accelerators, adaptive runtime techniques in high performance computing, efficient memory architectures for heterogeneous mobile systems, novel architectures for exascale systems, and other projects. We examine resilience through tolerating variation during chip fabrication, failure-tolerant processor architectures, scalable resilience protocols, and automated software debugging and recovery techniques. We explore programmability through architectural support for synchronization, automatic parallelization and vectorization, performance-portability for heterogeneous mobile systems, high-performance implementations of scripting languages, and highly scalable parallel run-time systems.

In addition to collaborating with major companies, our software artifacts like LLVM and Charm++ are widely used in industry, government labs, and academic research.
The study of systems that behave intelligently, artificial intelligence includes several key areas where our faculty are recognized leaders: computer vision, machine listening, natural language processing, and machine learning.

Computer vision systems can understand images and video, for example, building extensive geometric and physical models of cities from video, or warning construction workers about nearby dangers. Natural language processing systems understand written and spoken language; possibilities include automatic translation of text from one language to another, or understanding text on Wikipedia to produce knowledge about the world. Machine listening systems understand audio signals, with applications like listening for crashes at traffic lights, or transcribing polyphonic music automatically. Crucial to modern artificial intelligence, machine learning methods exploit examples in order to adjust systems to work as effectively as possible.
Our researchers work on core computational biology-related problems, including genomics, proteomics, metagenomics, and phylogenomics. We develop novel techniques that combine ideas from mathematics, computer science, probability, statistics, and physics, and we help identify and formalize computational challenges in the biological domain, while experimentally validating novel hypotheses generated by our analyses.

We are developing algorithms with improved accuracy for large-scale and complex estimation problems in phylogenomics (genome-scale phylogeny estimation), multiple sequence alignment, and metagenomics. We are exploring gene regulation—developing advanced techniques to predict the diverse function of noncoding parts of DNA and to relate interspecies and interpersonal differences in DNA to differences in the organism’s form and function. We work broadly in the development of machine learning techniques for computational biology, with research spanning the areas of molecular and structural biology; networks and systems biology; and molecular mechanisms of human disease.

**CS Faculty and Their Research Interests**

**Mohammed El-Kebir**
Phylogenetics

**Jiawei Han**
Data Mining For Genomics and Medical Informatics

**Jian Peng**
Bioinformatics, Protein Function & Structure, Systems Biology, Machine Learning and Optimization

**Saurabh Sinha**
Bioinformatics, Gene Regulation, Comparative Genomics, Sequence Analysis

**Tandy Warnow**
Bioinformatics, Multiple Sequence Alignment, Phylogenomics, Metagenomics, Historical Linguistics

**ChengXiang Zhai**
Information Retrieval, Natural Language Processing for Medical Informatics

**Related Research Efforts & Groups**

- Carl R. Woese Institute for Genomic Biology
- Carl Illinois College of Medicine
- Comp-Gen Initiative in the Carl R. Woese Institute for Genomic Biology
- KnowEnG, an NIH Center for Excellence for Big Data to Knowledge in the Carl R. Woese Institute for Genomic Biology
- Midwest Big Data Hub
- National Center for Supercomputing Applications
Computing has a large and growing impact on education. It is improving classroom interactivity, increasing accessibility, facilitating personalized learning inside and outside the classroom, and providing a platform for exploring fundamental questions about how people learn.

At the same time, demand for computer science education is skyrocketing worldwide. Reaching larger and more diverse audiences requires both understanding how people learn computer science and creating best practices for teaching specific computing topics.

Our faculty study broadly in both of these facets of computers and education. We build new systems, run them at scale, and design interfaces and study the human impacts of technology in the classroom. We gather and analyze data about student behavior to better understand the learning process using both data science techniques and qualitative research.

**CS FACULTY AND THEIR RESEARCH INTERESTS**

**John Hart**
Teaching at Scale, MOOCs

**ChengXiang Zhai**
Scalable Education, Applications of Information Retrieval, Data Mining, and ML

**Craig Zilles**
Computer-Based Testing, Learning Analytics, Plagiarism Detection

**RELATED RESEARCH EFFORTS & GROUPS**

- Academy for Excellence in Engineering Education
- Illinois Learning Analytics
- Office for Mathematics, Science, and Technology Education
The rapid growth of big data creates unprecedented demand and opportunities for developing powerful intelligent information systems that help people manage and extract knowledge from data.

Our faculty work on a wide range of research problems, tackling the many challenges associated with developing such intelligent systems and their applications. Research includes helping people search and find relevant data and information; mining massive amounts of heterogeneous data sets to discover actionable knowledge; optimizing the entire workflow of data access, analytics, and exploration; and analyzing large social networks and to optimize human-computer collaboration centered on data.

Our faculty work closely with industry, and many of our algorithms are used in a wide range of information system applications, especially in database and data analytics systems, data mining systems, search engines, and web information service systems.

CS FACULTY AND THEIR RESEARCH INTERESTS

Kevin C. Chang
Data Mining, Database Systems, Machine Learning, Information Retrieval, Web Search and Mining, Social Media Analytics

Jiawei Han
Data Mining, Data Warehousing, Database Systems, Information Networks

Aditya Parameswaran
Data Management, Data Mining, Database Theory, Interactive Systems, Crowdsourced Computation

Saurabh Sinha
Bioinformatics, Genomics

Hari Sundaram
Social And Information Networks, Wearable Sensors, Computational Advertising

ChengXiang Zhai
Information Retrieval, Text Mining, Natural Language Processing, Bioinformatics
Increasingly present in daily life, interactive technology needs to be designed effectively to avoid adverse consequences such as loss of life, productivity loss, and negative experiences. To solve these monumental problems, our researchers invent, implement, and study new forms of interaction, automation, and visualization techniques.

Our work targets problems in social computing, design and creativity, decision making, intelligent systems, and cognitive modeling. For example, we study the transparency of algorithms controlling social media feeds, the use of robotics in domestic environments to support aging in place, and the application of crowdsourcing for creative work. Working at times with companies like Microsoft, Intel, Google, and Facebook, our research synthesizes knowledge from machine learning, psychology, design, and the learning sciences. In graphics and visualization, our research includes modeling and animation of natural phenomena, computational topology, graphics hardware utilization, image-based rendering, implicit surfaces, procedural texturing, and surface parameterization.

CS FACULTY AND THEIR RESEARCH INTERESTS

Brian P. Bailey  
Human-Computer Interfaces, Creativity Support Tools, Online Innovation Communities, Collaboration in Multi-Device Environments

David A. Forsyth  
Graphics, Projection Mapping

Wai-Tat Fu  
Human-Computer Interaction, Information Systems, Knowledge Representation

John Hart  
Graphics, Computational Topology, Scientific Visualization

Karrie Karahalios  
Social Computing, Social Network Analysis, Social Spaces, Smart Infrastructure

Alex Kirlik  
Human Factors, Cognitive Engineering

Ranjitha Kumar  
Data-Driven Design, Human-Computer Interaction, Data Mining, Machine Learning, Web

Steven M. Lavalle  
Virtual Reality, Human Perception

Hari Sundaram  
Social And Information Networks, Wearable Sensors, Computational Advertising
The growing complexity and scale of software poses formidable challenges for reliability, security, performance, and productivity. Our faculty tackle these problems by developing innovative techniques in programming language design and semantics; techniques and tools for formal verification, software testing, and automated debugging; and models and verification techniques for embedded systems that interact with physical entities.

We are known for theoretical advances such as the Actor model of concurrency; rewriting logic and related semantic frameworks; concolic testing for automated test generation; automated logic reasoning; automated inference of specifications and invariants; and control-theoretic techniques for analyzing cyberphysical systems. We have also produced widely-used tools and techniques like the Maude rewriting engine; the LLVM compiler infrastructure; the Chisel optimization system for approximate computing; the first complete formalizations of C, Java, and JavaScript; regression test suite reduction techniques; and educational tools based on automated test generation (CodeHunt; Pex4Fun) that have attracted over a million users.
Simulation plays a major role in nearly every area of science and engineering—from data analysis to physical models. Our faculty design, build, and analyze the behavior of numerical algorithms to ensure that numerical methods are accurate and that implementations are efficient.

We design and analyze the accuracy of methods, developing numerical approximations to partial differential equations with advanced finite element methods and integral equations. We also develop solvers for these problems, instrumenting techniques based on numerical linear algebra, iterative subspace methods, and multigrid methods. Our research explores the efficiency of these methods on a range of architectures and environments, from high-concurrency nodes, such as GPUs, to large-scale supercomputing systems. We explore parallel scalability and analyze performance in computing kernels from graph algorithms to sparse linear algebra.

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**CS Faculty and Their Research Interests**

**Paul Fischer**
Numerical PDEs, Spectral Element Methods, Computational Fluid Dynamics, Parallel and High-Performance Algorithms, Iterative Methods

**Laxmikant Kale**
Simulation Software, Numerical Libraries, Algorithms

**Andreas Kloeckner**
Integral Equation Methods For PDEs, High-Order Finite Element Methods for Hyperbolic PDEs, Tools and Languages for High-Performance Computing, Time Integration

**William Kramer**
Extreme-Scale Computing and Analytics, Performance Evaluation, Data and Storage Techniques

**Luke Olson**
Numerical Analysis, Scientific Computing, Large-Scale Simulation

**Marc Snir**
Large-Scale Parallel Systems, Algorithms, Libraries

**Edgar Solomonik**
Communication Complexity

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**Related Research Efforts & Groups**

- Blue Waters in the National Center for Supercomputing Applications
- Center for Exascale Simulation of Plasma-Coupled Combustion
- Computational Science and Engineering
- National Center for Supercomputing Applications
- Parallel Computing Institute
- Theoretical and Computational Biophysics Group
Working on problems that are directly relevant to industry, our faculty are advancing the state of the art in cloud computing and systems for big data, software defined networks, wired and datacenter networking, Internet of Things, wearable computing, mobile computing, multimedia systems, security, privacy, health-care engineering systems, and cyber-physical systems.

We work collaboratively with industry partners including Google, Microsoft, AT&T, HP, and many others. Our research has also resulted in the creation of several startup companies. We produce creative and innovative students who become faculty at top-ranked schools, researchers at prestigious labs, and who join cutting-edge companies. Our courses are not just available to on-campus students, but a selection of them are also offered to off-campus students through Coursera MOOCs with enrollment numbers in the hundreds of thousands.
Theoretical computer science develops efficient algorithms and explores fundamental barriers to efficient and secure computation. Advances in algorithms can provide dramatic performance gains, which are critically important as the era of Moore’s Law—and its promise of ever-increasing processor speeds—draws to a close.

Our faculty develop algorithms to find optimal paths, trees, flows, clusters, and other important combinatorial structures in geometric and network data. For problems where computing the best possible solution is prohibitively expensive, we develop fast approximation algorithms to compute provably good solutions, and we explore the limits of what cannot even be approximated quickly. We develop algorithms that exploit geometric, algebraic, and topological properties of data that arise naturally in practice. Within cryptography, we develop protocols for secure multiparty computation and code obfuscation. In algorithmic game theory, we study the impact of strategic behavior among multiple agents. Our research, in addition to its fundamental importance, has many near-term applications in Computer Science and beyond.
The Research Park fosters opportunities for students and faculty to develop and commercialize new technology in conjunction with their academic work, enables established companies to collaborate with University of Illinois researchers, and gives students access to exciting internship opportunities. Research Park is also home to the EnterpriseWorks incubator facility and resource center for science and technology focused entrepreneurs.

» http://researchpark.illinois.edu

**THOMAS M. SIEBEL CENTER**

Most CS faculty and students work in the Thomas M. Siebel Center for Computer Science, which has some of the best classrooms, research & instructional labs, and informal meeting spaces on the Illinois campus. Our collaborative culture brings the best minds together to work on some of society’s most complex problems—from medical information privacy, to climate modeling, to transforming raw data into useful information, to understanding the genome. Our students have boundless opportunities to conduct multidisciplinary research focused on the computing challenges that society faces now, and into the future.

» http://cs.illinois.edu

**BLUE WATERS**

CS researchers have access to Blue Waters, the fastest supercomputer at a university anywhere in the world. Capable of completing more than 1 quadrillion calculations per second on a sustained basis, its peak speed is more than 13 times faster and (almost 3 million times faster than the average laptop). Researchers use Blue Waters to predict the behavior of complex biological systems, understand how the cosmos evolved after the Big Bang, design new materials at the atomic level, predict the behavior of hurricanes and tornadoes, and simulate complex engineered systems like the power distribution system and airplanes and automobiles.

» http://bluewaters.ncsa.illinois.edu

**TECHNOLOGY ENTREPRENEUR CENTER**

The Technology Entrepreneur Center (TEC) provides students and faculty with the skills, resources, and experiences necessary to become successful innovators, entrepreneurs, and leaders who tackle grand challenges and change the world. TEC offers courses; venture and product competitions (such as the Cozad New Venture Competition and the Illinois Innovation Prize); plus workshops and other events that expose students to the concepts of technology innovation and market adoption.

» http://tec.illinois.edu
LIFE AS A ILLINOIS CS STUDENT

At Illinois, you have access to countless opportunities and support to ensure an amazing experience both inside and outside the classroom.

DEPARTMENT OF COMPUTER SCIENCE
Visit the links below to learn more about life as a graduate student in our department.

CS Graduate Program Application Information: http://cs.illinois.edu/admissions/graduate

CS Graduate Program Policies: http://cs.illinois.edu/academics/graduate

Research: http://cs.illinois.edu/research

Faculty: http://cs.illinois.edu/people/faculty/department-faculty

CS Graduate Student Academic Council: http://publish.illinois.edu/computersciencegradacademiccouncil

CS Graduate Student Organization (CSGSO): https://www.facebook.com/csgso

COLLEGE OF ENGINEERING
Home to 12 academic departments, 9 multidisciplinary research centers, and 15 top-5 ranked degree programs, the College of Engineering’s students, faculty, and alumni set the standard for excellence while solving the world’s greatest challenges.

College of Engineering: http://engineering.illinois.edu/academics/graduate

Alumni Interviews: http://engineering.illinois.edu/academics/graduate/meet-alumni

Engineering Update: http://engineering.illinois.edu/student-life/engineering-update

Meet Engineering Graduate Students (YouTube playlist): http://go.cs.illinois.edu/meetENGstudents

Engineering Career Services: http://ecs.engineering.illinois.edu

GRADUATE COLLEGE
The Graduate College at the University of Illinois enrolls more than 10,000 graduate and professional students in more than 100 disciplines. Our graduate community is international in its composition and global in its impact.

Graduate College: http://grad.illinois.edu

Resources: http://grad.illinois.edu/students

Student Handbook and Policies: http://grad.illinois.edu/handbooks-policies

Diversity and Inclusion: http://grad.illinois.edu/diversity/about

New Student Quick Guide: http://grad.illinois.edu/quick-guide

UNIVERSITY OF ILLINOIS
Founded as the Illinois Industrial University in 1867, the University of Illinois at Urbana-Champaign was one of the original 37 public land-grant institutions created within 10 years of the signing of the Morrill Act by Abraham Lincoln in 1862.

Facts: http://illinois.edu/about/facts.html

Research: http://illinois.edu/research

Arts & Culture: http://illinois.edu/arts

News & Events: http://news.illinois.edu

International Student Resources: http://isss.illinois.edu

Housing: http://housing.illinois.edu

Student Health Insurance: http://www.uhcsr.com/illinois

FINANCIAL AID OPPORTUNITIES
Illinois Computer Science is committed to providing funding opportunities for graduate students. MS and PhD students may be offered a research or teaching assistantship—including a stipend, full tuition waiver, and partial fee waiver—making graduate school affordable.

Students may also qualify for fellowships offered by Illinois Computer Science, the College of Engineering, the Graduate College, or may apply to external funding agencies like the NSF. For more information on funding opportunities, please visit http://cs.illinois.edu/admissions/financial-aid.
**FINDING AN APARTMENT**
Contact the Tenant Union at the start of your housing search. Tell us what type of apartment you want—number of bedrooms, furnished, or unfurnished, preferred distance from campus (in blocks or miles) and price, and we’ll help you find one with a good landlord.

**LANDLORD COMPLAINT RECORDS**
While you are still narrowing down choices, check landlords’ complaint records and see how they compare. You can call, visit our office, or send the landlord names by email to tenant@illinois.edu.

**LEASE REVIEW**
An experienced housing counselor will review your lease with you and make suggestions for changes to discuss with the landlord BEFORE you sign the contract.

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**PROTECT YOURSELF BY FOLLOWING THESE TIPS**

1. Do not put down money to hold a place. Pay nothing until the landlord has signed the lease.

2. Be sure to see the exact unit you’ll be renting.

3. Beware of any construction not yet completed. New buildings are often not ready for move-in until weeks or months after classes start.

4. Don’t sign a lease unless you’re 100% positive you really want the place because **THERE IS NO WAY TO BREAK A LEASE**.

5. Choose roommates cautiously; you will be legally responsible for paying each other’s rent, utilities, late fees, and charges for damages.

6. Take PHOTOGRAPHS on the last day of the lease so you can defend yourself against bogus charges for cleaning or damages.

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**TENANT UNION**
University of Illinois at Urbana-Champaign
326 Illini Union, 1401 W. Green Street, Urbana, IL 61801
(217) 222-1002 / 9:00am – 5:00pm weekdays
tenant@illinois.edu / http://tenantunion.illinois.edu

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**HOUSING RESOURCES & QUICK LINKS**
The Tenant Union, a student fee supported service at the U of I, provides students with free housing assistance.
ENGAGE IN STUDENT GROUPS
While on campus, there are over 1,000 students groups that provide a range of activities that can include leadership, mentorship, volunteering, professional development, and social interactions. To deepen your experience while in Siebel Center, get involved in a CS-affiliated student group:


Blacks & African Americans in Computing (BAAC): http://baac.engr.illinois.edu/

CocoaNuts, for iOS developers: bit.ly/cocoanutsdev

CS Graduate Student Organization (CSGSO): www.facebook.com/csgso

Founders, for entrepreneurs: www.founders.illinois.edu

Latinos in Computer Science (LCS): http://go.cs.illinois.edu/lcs

Society of Industrial and Applied Mathematics (SIAM): http://siam.cs.illinois.edu

Women in Computer Science (WCS): www.illinoiswcs.org

AN AFFORDABLE MICRO-URBAN ENVIRONMENT
The cost of living in Champaign-Urbana is 60-178% less than cities like Berkeley, San Diego, and Boston, where our peer institutions are located. [Sperling’s Best Places]

Ranked the No. 4 small city for educated millenials. [Business Insider]

Learn about Champaign-Urbana’s micro-urban community: http://www.yourewelcomecu.com https://www.visitchampaigncounty.org

CAMPUS ACTIVITIES, AMENITIES, AND RESOURCES
Illini Union: http://union.illinois.edu

Illinois Athletics: http://fightingillini.com

Krannert Art Museum: http://kam.illinois.edu

Krannert Center for the Performing Arts: www.krannertcenter.com

Activities and Recreation Center (ARC): www.campusrec.illinois.edu/facilities/arc

GET ACQUAINTED WITH THE COMMUNITY
The Daily Illini, one of the country’s largest student-run newspapers: www.dailyillini.com

The News-Gazette, the newspaper and online source for news and advertising in East Central Illinois: www.news-gazette.com

40 North, a local nonprofit organization committed to cultivating creativity in Champaign County by promoting many community-wide events, programs, and resources: http://40north.org.
ALL THE AMENITIES OF BIG-CITY LIVING WITHOUT THE HASSLES

Conveniently centered between Chicago, Indianapolis, and St. Louis, the University of Illinois provides an entertainment and cultural hub on par with the country’s leading cities. Our campus community is home to Big 10 Division I sports; marquee theatrical, musical, dance performances; amazing festivals and fairs; and fantastic health and recreational facilities.
CHOOSE YOUR ADVANCED CS DEGREE PROGRAM

☐ MS in Computer Science
☐ PhD in Computer Science
☐ Professional Master of Computer Science (MCS)
  ☐ On-Campus and Online
  ☐ MCS Data Science Track: Online Only
☐ MS in Bioinformatics

APPLY BY THE DEADLINE

☐ MS/PhD in Computer Science: December 15 (Fall)
☐ On-Campus MCS: January 15 (Fall)
☐ Online MCS: October 15 (Spring) & May 30 (Fall)
☐ MCS Data Science Track: October 15 (Spring)
  & May 30 (Fall)
☐ MS in Bioinformatics: October 15 (Spring)
  & January 15 (Summer & Fall)

For more information visit go.cs.illinois.edu/GradPrograms
or contact:
Office of Graduate Programs
(217) 333-4428
On-Campus Programs: academic@cs.illinois.edu
Online Programs: mcs@cs.illinois.edu

WE DO THE IMPOSSIBLE EVERY DAY