Computer Science & Engineering

The Department of Computer Science & Engineering offers PhD programs in Computer Science and in Computer Engineering. Computer science research encompasses the fundamentals of software and algorithm design, machine learning and bioinformatics, visual and cyber-physical computing, and human-computer interaction. Computer engineering focuses on the interaction of software and hardware in the design of computing systems and networks. Our research groups have extensive interdisciplinary ties across the university, with collaborations in medicine, science, the humanities and social work. Recent graduates have accepted research and teaching faculty positions as well as research and engineering positions in leading technology companies.

Both PhD programs require a combination of courses, research and teaching. The required courses are often completed early in the program, since students are integrated into research groups during their first year and the program's emphasis is on creative research. The program has milestones that involve both written and oral components, and these provide structure for the five- to six-year degree. The program considers applicants with either bachelor's or master's degrees and has had successful applicants in the past whose backgrounds were outside of the field of computer science.

Phone: 314-935-6132
Email: admissions@cse.wustl.edu
Website: https://cse.wustl.edu/graduate/

Faculty

Chair
Roch Guérin (https://engineering.wustl.edu/Profiles/Pages/Roch-Guerin.aspx)
Harold B. and Adelaide G. Welge Professor of Computer Science
PhD, California Institute of Technology
Computer networks and communication systems

Professors
Sanjoy Baruah (https://engineering.wustl.edu/Profiles/Pages/Sanjoy-Baruah.aspx)
PhD, University of Texas at Austin
Real-time and safety-critical system design, cyber-physical systems, scheduling theory, resource allocation and sharing in distributed computing environments

Aaron Bobick (https://engineering.wustl.edu/Profiles/Pages/Aaron-Bobick.aspx)
James M. McKelvey Professor and Dean
PhD, Massachusetts Institute of Technology
Computer vision, graphics, human-robot collaboration

Michael R. Brent (https://engineering.wustl.edu/Profiles/Pages/Michael-Brent.aspx)
Henry Edwin Sever Professor of Engineering
PhD, Massachusetts Institute of Technology
Systems biology, computational and experimental genomics, mathematical modeling, algorithms for computational biology, bioinformatics

Jeremy Buhler (https://engineering.wustl.edu/Profiles/Pages/Jeremy-Buhler.aspx)
PhD, Washington University
Computational biology, genomics, algorithms for comparing and annotating large biosequences

Roger D. Chamberlain (https://engineering.wustl.edu/Profiles/Pages/Roger-Chamberlain.aspx)
DSc, Washington University
Computer engineering, parallel computation, computer architecture, multiprocessor systems

Yixin Chen (https://engineering.wustl.edu/Profiles/Pages/Yixin-Chen.aspx)
PhD, University of Illinois at Urbana-Champaign
Mathematical optimization, artificial intelligence, planning and scheduling, data mining, learning data warehousing, operations research, data security

Patrick Crowley (https://engineering.wustl.edu/Profiles/Pages/Patrick-Crowley.aspx)
PhD, University of Washington
Computer and network systems, network security

Ron K. Cytron (https://engineering.wustl.edu/Profiles/Pages/Ron-Cytron.aspx)
PhD, University of Illinois at Urbana-Champaign
Programming languages, middleware, real-time systems

Christopher D. Gill (https://engineering.wustl.edu/Profiles/Pages/Christopher-Gill.aspx)
DSc, Washington University
Parallel and distributed real-time embedded systems, cyber-physical systems, concurrency platforms and middleware, formal models and analysis of concurrency and timing

Sanmay Das (https://engineering.wustl.edu/Profiles/Pages/Sanmay-Das.aspx)
PhD, Massachusetts Institute of Technology
Design of algorithms for complex environments, computational social science, machine learning
Raj Jain
Barbara J. & Jerome R. Cox Jr. Professor of Computer Science
PhD, Harvard University
Network security, blockchains, medical systems security, industrial systems security, wireless networks, unmanned aircraft systems, internet of things, telecommunications networks, traffic management

Tao Ju
PhD, Rice University
Computer graphics, visualization, mesh processing, medical imaging and modeling

Chenyang Lu
Fullgraf Professor in the Department of Computer Science & Engineering
PhD, University of Virginia
Internet of things, real-time, embedded, and cyber-physical systems, cloud and edge computing, wireless sensor networks

Neal Patwari
PhD, University of Michigan
Application of statistical signal processing to wireless networks, and radio frequency signals

Weixiong Zhang
PhD, University of California, Los Angeles
Computational biology, genomics, machine learning and data mining, and combinatorial optimization

Associate Professors

Kunal Agrawal
PhD, Massachusetts Institute of Technology
Parallel computing, cyber-physical systems & sensing, theoretical computer science

Caitlin Kelleher
Hugo F. & Ina Champ Urbauer Career Development Associate Professor
PhD, Carnegie Mellon University
Human-computer interaction, programming environments, and learning environments

William D. Richard
PhD, University of Missouri-Rolla
Ultrasonic imaging, medical instrumentation, computer engineering

Yevgeniy Vorobeychik
PhD, University of Michigan
Artificial intelligence, machine learning, computational economics, security and privacy, multi-agent systems

William Yeoh
PhD, University of Southern California
Artificial intelligence, multi-agent systems, distributed constraint optimization, planning and scheduling

Assistant Professors

Ayan Chakrabarti
PhD, Harvard University
Computer vision computational photography, machine learning

Roman Garnett
PhD, University of Oxford
Active learning (especially with atypical objectives), Bayesian optimization, and Bayesian nonparametric analysis

Chien-Ju Ho
PhD, University of California, Los Angeles
Design and analysis of human-in-the-loop systems, with techniques from machine learning, algorithmic economics, and online behavioral social science

Brendan Juba
PhD, Massachusetts Institute of Technology
Theoretical approaches to artificial intelligence founded on computational complexity theory and theoretical computer science more broadly construed

Ulugbek Kamilov
PhD, École Polytechnique Fédérale de Lausanne, Switzerland
Computational imaging, image and signal processing, machine learning and optimization

Angelina Lee
PhD, Massachusetts Institute of Technology
Designing linguistics for parallel programming, developing runtime system support for multithreaded software, and building novel mechanisms in operating systems and hardware to efficiently support parallel abstractions
Alvitta Ottley (https://cse.wustl.edu/faculty/Pages/faculty.aspx?bio=109)
PhD, Tufts University
Designing personalized and adaptive visualization systems, including information visualization, human-computer interaction, visual analytics, individual differences, personality, user modeling and adaptive interfaces

Netanel Raviv (https://cse.wustl.edu/faculty/Pages/faculty.aspx?bio=197)
PhD, Technion, Haifa, Israel
Mathematical tools for computation, privacy and machine learning

Ning Zhang (https://cse.wustl.edu/faculty/Pages/faculty.aspx?bio=182)
PhD, Virginia Polytechnic Institute and State University
System security, software security

Teaching Professor
William Siever (https://cse.wustl.edu/faculty/Pages/Bill-Siever.aspx)
PhD, Missouri University of Science and Technology
Computer architecture, organization, and embedded systems

Todd Sproull (https://cse.wustl.edu/faculty/Pages/Todd-Sproull.aspx)
PhD, Washington University
Computer networking and mobile application development

Professor of the Practice
Dennis Cosgrove (https://cse.wustl.edu/faculty/Pages/Dennis-Cosgrove.aspx)
BS, University of Virginia
Programming environments and parallel programming

Lecturers
Hila Ben Abraham, Lecturer
PhD, Washington University in St. Louis
Parallel computing, accelerating streaming applications on GPUs, computer and network security, malware analysis

Steve Cole, Senior Lecturer
PhD, Washington University in St. Louis
Parallel computing, accelerating streaming applications on GPUs

Brian Garnett (https://cse.wustl.edu/faculty/Pages/faculty.aspx?bio=204), Lecturer
PhD, Rutgers University
Discrete mathematics and probability, generally motivated by theoretical computer science

Marion Neumann (https://cse.wustl.edu/faculty/Pages/Marion-Neumann.aspx), Senior Lecturer
PhD, University of Bonn, Germany
Machine learning with graphs; solving problems in agriculture and robotics

James Orr, Lecturer
PhD, Washington University
Real-time systems theory and implementation, cyber-physical systems, and operating systems

Jonathan Shidal (https://cse.wustl.edu/faculty/Pages/Jon-Shidal.aspx), Lecturer
PhD, Washington University
Computer architecture and memory management

Douglas Shook (https://cse.wustl.edu/faculty/Pages/Doug-Shook.aspx), Senior Lecturer
MS, Washington University
Imaging sensor design, compiler design and optimization

Senior Professors
Jonathan S. Turner
PhD, Northwestern University
Design and analysis of internet routers and switching systems, networking and communications, algorithms

Senior Faculty Emeritus
Jerome R. Cox Jr.
ScD, Massachusetts Institute of Technology
Computer system design, computer networking, biomedical computing

Professors Emeriti
Takayuki D. Kimura
PhD, University of Pennsylvania
Communication and computation, visual programming

Seymour V. Pollack
MS, Brooklyn Polytechnic Institute
Intellectual property, information systems

Degree Requirements
PhD in Computer Science or Computer Engineering

Students can choose to pursue a PhD in Computer Science or a PhD in Computer Engineering. The requirements vary for each degree. Here are the core requirements:

- Complete 72 units of regular — including graded — courses (at least 33 units, of which 9 must fulfill breadth requirements), seminars (at least 3 units), and research credits (at least 24 units).
- Satisfy fundamental teaching requirements by participating in mentored teaching experiences and complete scholarly communication requirements by participating in the Doctoral Student Research Seminar.
• Pass milestones that demonstrate the ability to understand research literature, to communicate orally and in writing, and to formulate a detailed research plan. These milestones include an oral qualifying examination, a dissertation proposal defense, and a dissertation defense.

For more information, please refer to the Doctoral Program Guide available on the Computer Science & Engineering website (https://cse.wustl.edu/graduate/programs/Pages/phd-programs.aspx).