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
Harold B. and Adelaide G. Welge Professor of Computer Science
PhD, California Institute of Technology
Computer networks and communication systems

Professors

Sanjoy Baruah
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
Harold B. and Adelaide G. Welge Professor of Computer Science
PhD, Massachusetts Institute of Technology
Computer vision, graphics, human-robot collaboration

Michael R. Brent
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
PhD, Washington University
Computational biology, genomics, algorithms for comparing and annotating large biosequences

Roger D. Chamberlain
DSc, Washington University
Computer engineering, parallel computation, computer architecture, multiprocessor systems

Yixin Chen
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
PhD, University of Washington
Computer and network systems, network security

Ron K. Cytron
PhD, University of Illinois at Urbana-Champaign
Programming languages, middleware, real-time systems

Christopher D. Gill
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

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 (https://engineering.wustl.edu/faculty/Tao-Ju.html)
PhD, Rice University
Computer graphics, visualization, mesh processing, medical imaging and modeling

Chenyang Lu (https://engineering.wustl.edu/faculty/Chenyang-Lu.html)
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 (https://engineering.wustl.edu/faculty/Neal-Patwari.html)
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 (https://engineering.wustl.edu/faculty/Kunal-Agrawal.html)
PhD, Massachusetts Institute of Technology
Parallel computing, cyber-physical systems and sensing, theoretical computer science

Roman Garnett (https://engineering.wustl.edu/faculty/Roman-Garnett.html)
PhD, University of Oxford
Active learning (especially with atypical objectives), Bayesian optimization, and Bayesian nonparametric analysis

Brendan Juba (https://engineering.wustl.edu/faculty/Brendan-Juba.html)
PhD, Massachusetts Institute of Technology
Theoretical approaches to artificial intelligence founded on computational complexity theory and theoretical computer science more broadly construed

Caitlin Kelleher (https://engineering.wustl.edu/faculty/Caitlin-Kelleher.html)
Hugo F. & Ina Champ Urbauer Career Development Associate Professor
PhD, Carnegie Mellon University
Human-computer interaction, programming environments, and learning environments

I-Ting Angelina Lee
PhD, Massachusetts Institute of Technology
Designing linguistics for parallel programming, developing runtime system support for multi-threaded software, and building novel mechanisms in operating systems and hardware to efficiently support parallel abstractions

PhD, University of Missouri-Rolla
Ultrasonic imaging, medical instrumentation, computer engineering

Yevgeniy Vorobeychik (https://engineering.wustl.edu/faculty/Yevgeniy-Vorobeychik.html)
PhD, University of Michigan
Artificial intelligence, machine learning, computational economics, security and privacy, multi-agent systems

Assistant Professors
Ayan Chakrabarti (https://engineering.wustl.edu/faculty/Ayan-Chakrabarti.html)
PhD, Harvard University
Computer vision computational photography, machine learning

Chien-Ju Ho (https://engineering.wustl.edu/faculty/Chien-Ju-Ho.html)
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

Ulugbek Kamilov (https://engineering.wustl.edu/faculty/Ulugbek-Kamilov.html)
PhD, École Polytechnique Fédérale de Lausanne, Switzerland
Computational imaging, image and signal processing, machine learning and optimization

Alvitta Ottley (https://engineering.wustl.edu/faculty/Alvitta-Ottley.html)
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://engineering.wustl.edu/faculty/Netanel-Raviv.html)
PhD, Technion, Haifa, Israel
Mathematical tools for computation, privacy and machine learning

Ning Zhang (https://engineering.wustl.edu/faculty/Ning-Zhang.html)
PhD, Virginia Polytechnic Institute and State University
System security, software security
Teaching Professor

Bill Siever
PhD, Missouri University of Science and Technology
Computer architecture, organization, and embedded systems

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

Professor of the Practice

Dennis Cosgrove (https://engineering.wustl.edu/faculty/Dennis-Cosgrove.html)
BS, University of Virginia
Programming environments and parallel programming

Senior Lecturers

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

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

PhD, Washington University
Computer architecture and memory management

Douglas Shook (https://engineering.wustl.edu/faculty/Doug-Shook.html)
MS, Washington University
Imaging sensor design, compiler design and optimization

Lecturers

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

Brian Garnett (https://engineering.wustl.edu/faculty/Brian-Garnett.html)
PhD, Rutgers University
Discrete mathematics and probability, generally motivated by theoretical computer science

James Orr (https://engineering.wustl.edu/faculty/James-Orr.html)
PhD, Washington University
Real-time systems theory and implementation, cyber-physical systems, and operating systems

Senior Professor

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).