Department of Computer Science

Chair

• Michael Franklin (as of 7/1/2016)

Professors

• Yali Amit
• Laszlo Babai
• Andrew Chien
• Frederic Chong
• Todd Dupont
• Ian Foster
• Michael Franklin
• John Goldsmith
• Stuart A. Kurtz
• John Lafferty
• Ketan Mulmuley
• Michael J. O Donnell
• Alexander Razborov
• John Reppy
• L. Ridgway Scott
• Janos Simon
• Rick L. Stevens

Associate Professors

• Shan Lu
• Anne Rogers

Assistant Professors

• Ravi Chugh
• Andrew Drucker
• Aaron Elmore
• Ariel Feldman
• Haryadi Gunawi
• Henry Hoffmann
The Department of Computer Science is dedicated to advancing and improving the knowledge, understanding, and practice of computer science through basic research and education.

Research

We construe the field of computer science broadly to include the complementary concepts of computation, information, and communication. We employ modes of inquiry and creation from pure mathematics to experiment and observation to design and engineering. We investigate computation, information, and communication as inherently interesting phenomena; we also investigate the many ways in which computational concepts engage other topics: computational tools for science and scholarship, computational infrastructure for society.

Current active research areas include computing systems, computer architecture, computer security and privacy, error-tolerant computing and error recovery in computing systems, databases and data intensive computing, theoretical computer science, discrete mathematics, quantum computing, programming languages, machine learning, computational linguistics, computer vision, cloud computing, sustainable computing, scientific computing and visualization, high performance computing, human-computer interaction, computer science education, and interdisciplinary research in computing in the physical, biological, and social sciences.

Artificial intelligence

Research spans the spectrum from foundational work in statistical machine learning to computer vision and computational linguistics. The AI group has strong ties to CAMI, the University's Computational and Applied Mathematics Initiative.
Computational Mathematics

Our faculty and students study the foundations of simulation technology. This includes the development and mathematical analysis of numerical algorithms for approximating partial differential equations. We also study language and systems aspects of numerical computing, as exemplified in the FEniCS Project. Parallel and high performance computing are an integral part of our efforts.

Systems

Our faculty advance principles and understanding of a broad range of areas, including systems and networking, programming languages and software engineering, software and hardware architecture, data-intensive computing and databases, graphics and visualization, computer security, and systems biology. Particular areas of focus include formal definition, design, and implementation of programming languages, data-intensive computing systems and algorithms, large scale distributed and collaborative systems, heterogeneous computer architectures, reliable computing systems, self-tuning systems, and emerging technologies.

Theoretical computer science

We investigate the fundamental concepts underlying computation using and developing mathematical techniques, as well as topics in discrete mathematics. Our faculty specialize in complexity theory, algorithms, discrete mathematics, and combinatorics.

These efforts are enhanced by strong connections to the Computation Institute, which develops computational tools and techniques for a broad range of disciplines, including biological and physical sciences, medicine, law, the arts, social sciences, and humanities; the James Frank Institute, which focuses on condensed matter physics; the Institute for Biophysical Dynamics, which provides a forum for studying questions that arise at the boundary between the biological and physical sciences; and the Institute for Molecular Engineering. In addition, we have collaborations with faculty in academic departments, including the geophysical sciences, linguistics, mathematics, physics, psychology, and statistics, and well as with the Division of Mathematics and Computer Science at Argonne National Laboratory (ANL), which is operated by the University of Chicago for the US Department of Energy. We also have almost seamless collaborations with the Toyota Technological Institute on campus, especially in the areas of Theoretical Computer Science and Machine Learning.

Graduate Programs

We offer two graduate curricula in computer science.

1. A graduate professional curriculum leading to the Master of Science (MS) degree, for students who wish to enter or advance themselves in computer science practice.
2. A graduate research curriculum leading to the PhD degree that prepares students to perform advanced basic research in computer science either in industry or academia. Teaching experience is available for students preparing for academic careers.

Acquire further information about our Masters Program in Computer Science (MPCS) through the MPCS website (http://masters.cs.uchicago.edu), by writing to our MPCS Admissions, Department of Computer Science, University of Chicago, 1100 East 58th Street, Chicago, IL 60637, or by telephoning 773.834.3388. You may also email any questions to our questions@cs.uchicago.edu email address.

Acquire further information about our PhD program through our PhD admissions website (http://csphd.sites.uchicago.edu/page/admission-phd-program), by writing to Admissions, Department of Computer Science, University of Chicago, 1100 East 58th Street, Chicago, IL 60637, or by telephoning 773.702.6011.

General information about our department is available from the departmental website (http://www.cs.uchicago.edu).

The PhD Program

The department offers two PhD tracks: a standard track and a computational mathematics track.

The detailed requirements for the PhD degree and for the MS degree within the PhD program can be found by visiting the Department’s web page (http://www.cs.uchicago.edu). Here is a brief summary:

To obtain an MS degree within the PhD program, students in the PhD program must fulfill the following requirements:

- Course requirements. Five core courses and four electives. The core courses include two in Theory, two in Systems, and one in Machine Learning. Please refer to the web page for details regarding the core courses.

A modified set of core courses applies to the computational mathematics track (see the website). The list of electives is frequently updated; we refer you to the web page.

Students must complete the course requirements by the end of their second year of study. To receive an MS degree within the PhD program, students must receive a grade of at least B in all the nine courses and have a GPA of at least 3.00 in the five core courses, and write a Master’s paper and pass a Master’s examination.
To obtain a PhD degree, students must meet enhanced MS requirements, including at least B on each of the nine courses and a GPA of at least 3.25 on the five core courses; plus the following:

- Pass a Candidacy Exam
- Write and defend a Doctoral Thesis that contains significant original research in computer science.

Teaching Opportunities for Students in the PhD Program

The department takes its undergraduate teaching responsibilities very seriously, and offers supervised teaching opportunities, including lecturing, acting as teaching assistants, and working as lab assistants to its best graduate students.

Computing Facilities

In addition to the general University computing facilities including the Research Computing Center (https://rcc.uchicago.edu/resources) and access to high performance computers at ANL, and our Computer Science Instructional Laboratory (which contains about 50 Macintosh computers and 40 desktops running Linux), the Ryerson Research Computing Service provides the faculty, students, and postdoctoral associates in computer science with computing resources. We have the flexibility to adapt quickly to new research needs.

The resources include: 24 hour 7 day interactive computing on a number of shared computing servers as well as individually assigned desktops. These servers and desktops run the Linux operating system and are interconnected via high speed Ethernet. These systems are supported by substantial amounts of both local and networked disk storage for individual and group use which are backed up regularly. Linux servers are available for general instructional and research purposes as well as hardware and virtual machines which are adapted to specialized needs.

Courses

For the list of courses offered and the course descriptions, please consult the courses section of the departmental web page (http://www.cs.uchicago.edu/courses).
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Times was used instead of Trajan.

Times was used instead of Palatino.

The editor may contact Leepfrog for a draft with the correct fonts in place.