COMPUTER AND COMMUNICATION SCIENCES

DOCTORAL SCHOOL

EPFL
Our program is seeking ambitious and talented individuals who aspire to be at the center of the technological revolution where information is at the core of innovation. We have an award-winning and internationally recognized faculty targeting broad research areas and working closely with top international research organizations. With a rich intellectual environment, a working culture and resources only matched by the highest-rated academic institutions, our program targets training bright minds to be the research and industrial leaders of the information technology revolution.

IC Centers

Housed at EPFL, the Center for Digital Trust (C4DT) is a competence center that brings together 12 founding partners, 35 laboratories, civil society, and policy actors to collaborate, share insight, and to gain early access to trust-building technologies, building on state-of-the-art research at EPFL and beyond. https://www.c4dt.org

The Scala Center acts as an open source foundation for Scala. It engages with developers in the open-source community in the effort to improve the language, its tools and its documentation. It also helps developers learn the language through MOOCs, seminars and other activities. The Scala Center is funded for the most part by donations from industrial partners. https://scala.epfl.ch

Related Centers

The Swiss Data Science Center is a joint venture between EPFL and ETH Zurich. Its mission is to accelerate the adoption of data science and machine learning techniques within academic disciplines of the ETH Domain, the Swiss academic community at large, and the industrial sector. The center is composed of a large multi-disciplinary team of scientists. https://datascience.ch/

The mission of EcoCloud is to provide world-class leadership for, and to drive innovation in, resilient, efficient, secure and trustworthy data platforms and technologies. We aim to address the major IT challenges that affect us all. Indeed, our success synergistically builds on strong support for private industry. https://ecocloud.ch
Can you trust the result of your numerical computation?

My research focuses on techniques that help scientists and programmers gain confidence in the correctness and accuracy of numerical computations. These computations arise in a number of important areas, from cyber-physical systems such as train car controllers to scientific computing applications like simulations. Developing accurate numerical software is difficult because of finite representation of numbers, approximate numerical algorithms, and noisy data. The goal of my research is to facilitate the writing of numerical software by enabling the scientist to write programs using real arithmetic and a specification of uncertainties and let the compiler automatically choose the appropriate data type and algorithmic approximation. For example, my tools can verify that ranges of variables and round-off errors in floating-point or fixed-point computations stay bounded below a certain threshold.

My work builds on state-of-the-art theorem-proving technology, which is quickly evolving. This requires me to stay continuously up-to-date and follow up on changes, but also makes my work exciting.

I appreciate very much that I was able to choose my PhD topic myself, allowing me to combine my interest in computer science, mathematics and physics. During my four years at EPFL and while presenting my work at conferences and seminars around the world, I met many interesting people and had many conversations that resulted in new ideas for my work. It feels great to be part of the international research community!

Dr. Eva Darulova, PhD thesis at the Laboratory for Automated Reasoning and Analysis, now tenue-track at the Max-Planck Institute for Software Systems

Can one hear the shape of a room?

I came to EPFL to do signal processing, and Martin Vetterli gave me this fantastic problem for me. It was about acoustics, and the problem’s pet name was “Can one hear the shape of a room?”. Imagine you’re blindfolded in a room and you snap your fingers... what can you say about the shape of the room from the echoes?

Quickly I realized how pleasurable it is to work on this problem at EPFL. We had access to everything we needed for our experiments: equipment, support, enthusiasm. We were even granted evening access to the monumental Lausanne cathedral to experiment with the acoustics!

That’s what I love about research in Martin’s lab. We’re curious about something, and we ask a question. Interacting with other researchers (there’s a strong conference-going culture in the lab), we learn that they’re curious about something similar, but they call it something else. We can’t make our ideas work, we get frustrated, so we move to work on new problems spawned by the original one. Suddenly, we get this simplest idea that solves the original problem, and the next thing you know, we’re popping balloons in the Lausanne cathedral!

Our solution is a combination of room acoustics, inverse problems, and Euclidean geometry---for any of these topics there’s someone in the school that you can talk to. What’s more, you get to attend courses about various topics from computer science, signal processing and information theory, given by the very people who invented these topics. Our results are start-up-worthy. The support we get around here is terrific:

We are provided with access to funding, training, contacts, a number of already successful companies, working space, connections in the Silicon Valley, and the inspiration to go for it.

Dr. Ivan Dokmanić, PhD thesis at the Audiovisual Communications Laboratory, now assistant professor in Electrical and Computer Engineering at the University of Illinois at Urbana-Champaign
Program requirements

Admission to our program is centralized and highly competitive. The program is entirely in English with a duration of 4-6 years. Most admitted students enter the program in the Fall semester; in exceptional cases students can also start in the Spring semester. During their first year, students should take at least one advanced course in an area related to their research interest, participate in research projects, and pass a candidacy exam. PhD students also participate in the teaching activities of the school as teaching assistants and therefore acquire teaching skills. The program supports all admitted students financially at competitive salaries. The majority of the students (based on ranking at the time of admission) receive a one-year fellowship from the school and are free to choose a thesis advisor and area of research in the first year. The school also provides generous resources for traveling to conferences and attending summer schools.

Application

At the time of enrollment, a student must have a 4 or 5-year bachelor’s degree, or a master’s degree, with a strong background in computer science, communication systems, electrical engineering, mathematics, physics, or a related field. Candidates are invited to submit their applications prior to December 15th deadline for early admission, and at the latest by April 15th. The application process is fully electronic, including the submission of reference letters (no hardcopies). Referees will be automatically contacted by e-mail upon submission of the application. Applicants are encouraged to submit their application material early to allow sufficient time for the referees to respond prior to the chosen deadline. Submitting an application is free of charge.

Discover what former PhD students say about us: https://go.epfl.ch/phd-edic-testimonials

Research Areas

- **Algorithms & Theoretical Computer Science**
- **Artificial Intelligence & Machine Learning**
- **Computational Biology**
- **Computer Architecture & Integrated Systems**
- **Data Management & Information Retrieval**
- **Graphics & Vision**
- **Human-Computer Interaction**
- **Information & Communication Theory**
- **Networking**
- **Programming Languages & Formal Methods**
- **Security, Privacy & Cryptography**
- **Signal & Image Processing**
- **Systems**

Further information on our research areas: https://www.epfl.ch/schools/ic/research/

Additional information

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