DATA SCIENCE

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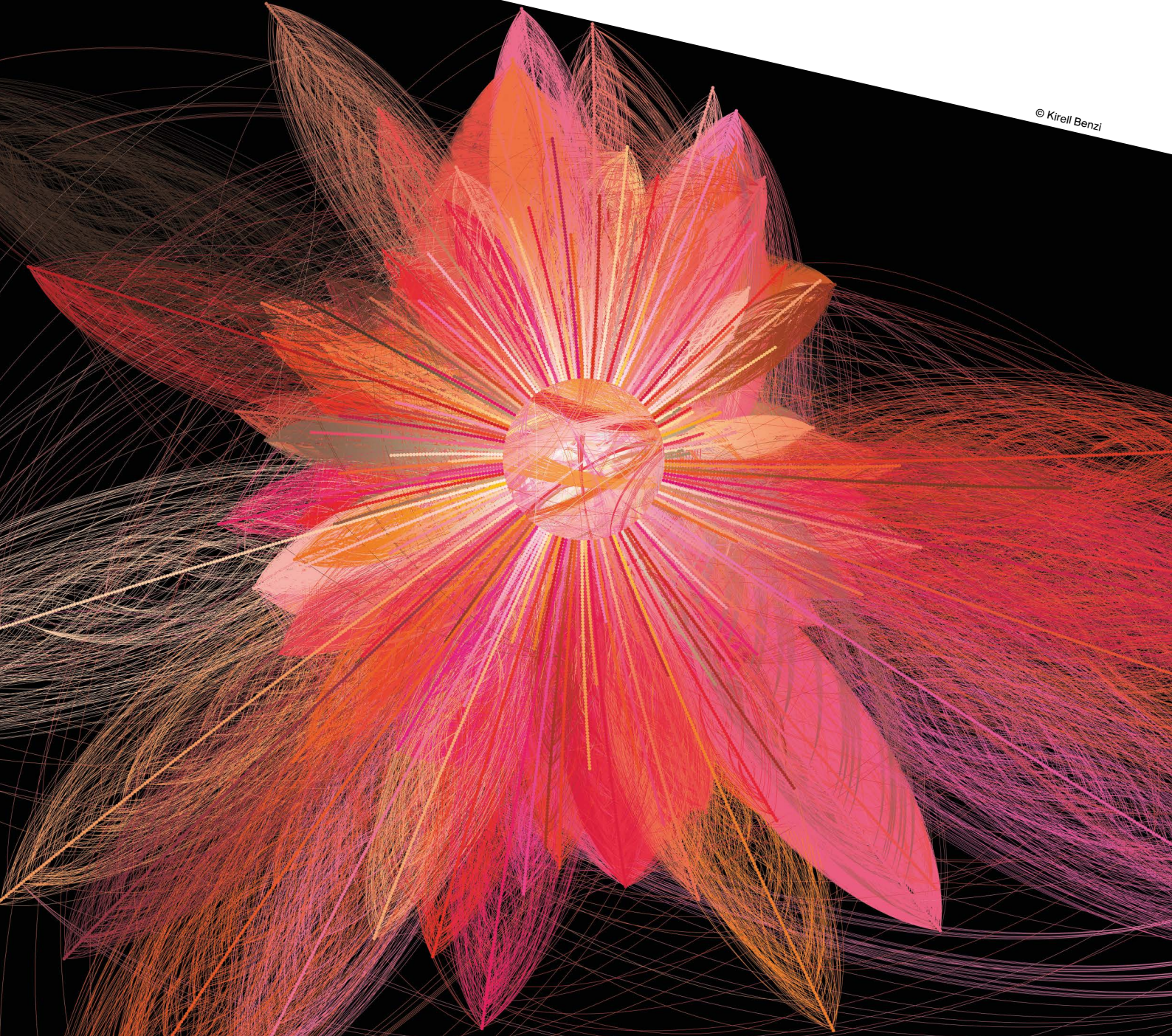**EPFL**

Mobile devices, sensors, web logs, instruments and transactions produce massive amounts of data by the second. As powerful new technologies emerge, Data Science allows to gain insight by analyzing this large and often heterogeneous data. The Master's program in Data Science offers a comprehensive education from the foundations to implementation, placing students at the forefront of this exciting field.

Meet the challenges of the digital universe

Over the last years, organizations in almost every domain have radically changed their decision-making processes. They no longer seek to merely satisfy existing stakeholder needs. There is now a fierce competition on who can best tap into the vast amount of available information in order to create new opportunities and more efficient markets.
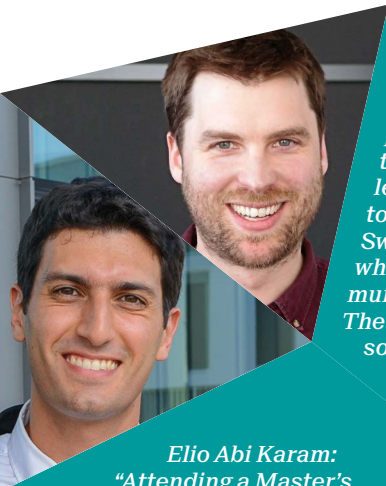
Data Science has emerged out of this paradigm shift. This new, multidisciplinary style of analysis, utilizes techniques from computer science, mathematics and statistics, while requiring astute problem understanding and good communication skills. It aims to answer questions such as, "how can the data generated be useful ?" These anticipation and prediction abilities have made Data Science one of the most active fields in industry with a continuing shortage of talent.

Learn to gain insight from data

During your studies in Data Science, you will gain a comprehensive education from algorithms to database architecture, and from information theory to machine learning.
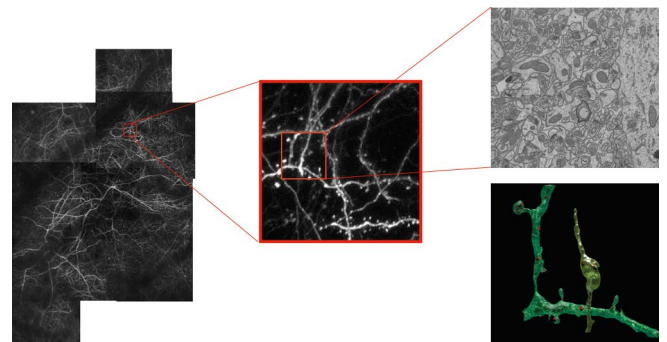
With the objective that by the end of your Master program, you will be well-versed on a variety of tools, perspectives and approaches to be able to identify the most appropriate methods and models to use to solve each specific case. You will gain the ability to use different types of data in real-time in order to make complex predictions and computations at scale.
You will also have first-hand access to cutting-edge research and to exciting industrial internship and career opportunities.
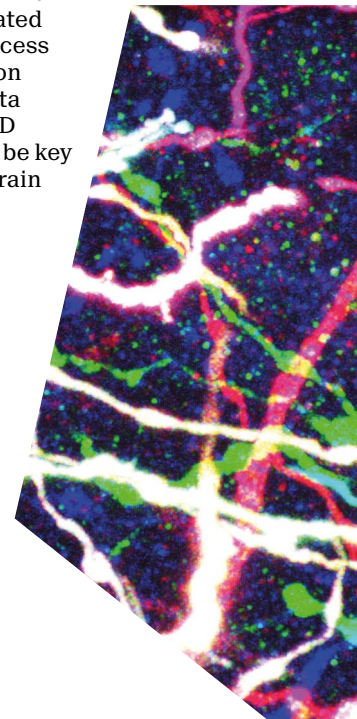
Julien Herzen:
"At Swisscom, I build data analytics pipelines using Big Data technologies and machine-learning systems in order to measure traffic flows in Switzerland in real-time, which in turn helps Swiss municipalities run better. The challenge is to filter, sort, transform and analyze million data points to extract only what is essential."

Elio Abi Karam:
"Attending a Master's program in the IC School will definitely give you the tools you need to undertake a career path in Data Science. Thorough courses and projects, as well as inspiring professors will make you proficient in a wide variety of topics. My advice to you is: make the most out of it."

Unravelling the Mysteries of the Human Brain

A team of researchers is working to unravel the mysteries of the human brain by developing a precise understanding of how neurons connect to each other. They develop automated image understanding techniques designed to process and interpret large quantities of high-resolution imagery–potentially hexabytes of image data for each individual brain–to model the 3D structure of brain networks. This will be key to the understanding of how the brain functions.

Predictive maintenance program for a large telecommunication provider

In order to maintain a powerful infrastructure, a local large telecommunications provider is combining and analyzing various sources of data (latencies, TV network statistics, warnings from application logs and monitoring systems) to extract statistical indicators of failure. Using Machine Learning systems able to understand and model failure patterns, the company can now anticipate them a few days in advance.

Master of Science in
DATA SCIENCE

2-year program - 120ECTS

Master's thesis
30 ECTS

Core courses
and options
72 ECTS

Project in
social and
human
sciences
6 ECTS

Research
project
12 ECTS

The program includes a compulsory internship of eight weeks during the summer, or six months during the semester. The internship can also be combined with the master's thesis.

Students may choose a Teaching specialization (30 ECTS at the *Haute école pédagogique du canton de Vaud*).

Or opt for a 30 ECTS minor included in the 120 ECTS.

Career prospects

The internship portal, with more than 3000 active contacts, is a very effective way to promote internships and master projects. All the big companies like Sony International, NEC Labs and AIP Riken are listed, but not only. There are many SMEs and start-ups too. The EPFL Innovation Park, a few steps away from the campus, hosts many R&D laboratories such as Logitech or Swisscom. These companies hire a large number of Data Science students for internships or master's projects and also collaborate with researchers from the IC School.

The EPFL Innovation Park is the springboard for numerous start-ups, most of which have emerged from the IC School.

It only takes on average 7 weeks to find one's first job. Moreover, many Data Science graduates receive a job offer during the last semester of their training. Companies such as Oracle, Google, Meta, or Microsoft, recruit directly on campus by participating in various events.

School of Computer and Communication Sciences
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	Credits
Core courses (min. 32 credits)	
Algorithms II	8
Applied data analysis	8
Foundations of data science	8
Information security and privacy	8
Machine learning	8
Modern natural language processing	8
Optimization for machine learning	8
Statistics for data science	8
Systems for data management and data science	8

Options	
Advanced compiler construction	6
Advanced cryptography	6
Advanced probability and applications	8
Advanced topics on privacy enhancing technologies	8
AI product management	6
Applied biostatistics	5
Artificial neural networks/reinforcement learning	6
Automatic speech processing	3
Basics of mobile robotics	4
Causal inference	4
Causal thinking	5
Computational complexity	6
Computational linear algebra	5
Computational neuroscience: neural dynamics	5
Computational photography	6
Computer vision	6
Computers and music	6
Concurrent computing	6
Cryptography and security	8
Data visualization	6
Deep learning	4
Deep learning in biomedicine	6
Digital education	6
Distributed algorithms	8
Distributed information systems	6
Distributed intelligent systems	5
Formal verification	6
Geometric computing	6
Graph theory	5
Image analysis and pattern recognition	4
Information theory and coding	8
Intelligent agents	6
Interaction design	6
Introduction to natural language processing	6
Large-scale data science for real-world data	6
Learning theory	6
Linear models	5
Machine learning for behavioral data	6
Management de projet et analyse du risque	4
Markov chains and algorithmic applications	6
Mathematical foundations of signal processing	6
Mathematics of data: from theory to computation	6
Networks out of control	6
Optional research project in data science	8
Risk, rare events and extremes	5
Software security	6
Statistical mechanics and Gibbs measures	5
Statistical physics of computation	4
Statistical theory	5
Student seminar : security protocols and applications	3
Sublinear algorithms for big data analysis	6
The GC maker project	6
Time series	5
Topics in theoretical computer science	6
Virtual reality	6
Visual intelligence: machines and minds	6