My entire academic path from Bachelor’s degrees in Informatics to Master studies in computational science has been here at USI. In my perspective, the two most appealing aspects about Informatics at USI are the high professional/student ratio and the teaching focus on both theory and practice. During my studies I also had the opportunity to work at the Institute of Computational Science (ICS), which allowed me to explore the world of high-performance computing and scientific simulations. Studying and working in this field has been a really enriching experience. For this reason I decided to continue my career development here at the ICS with Ph.D. studies.

Patrick Zulian, former Master Student, now Ph.D. Candidate

Modern business analytics has become a high-tech industry based on decision modeling, mathematical programming, and complex simulations. There is an intriguing quest for advanced levels of computational simulations and data analytics within the Financial Technology & Discovery Services at Ernst & Young AG, Zurich. This requires not only unconventional ideas but also motivated and well educated students that have a profound knowledge of various disciplines which are offered within the MCS master at USI.

Dr. Madan Sathe, Financial Technology & Discovery Services, Ernst & Young AG, Zurich, Switzerland

I am a Ph.D. student in the group "Computational Time Series Analysis". Our goal is the development of novel techniques for time series analysis and prediction. My research interest is dedicated to the analysis of extreme events like heat waves or heavy precipitation. During my Ph.D. studies I did not only dive into the research of time series analysis, but also established a strong basis in data analysis and machine learning. The education and experience, gained through my studies, provide a stable foundation not only for a scientific but also for an engineering or financial career, e.g. as data or risk analyst.

Olga Kaisar, Ph.D. Candidate

The computer industry is currently undergoing a tremendous change from homogenous, sequential architectures to heterogeneous, massively parallel ones. In order to master this transition, we need a new generation of computational scientists capable of designing next generation algorithms. The new curriculum in computational sciences at USI will offer a great balance between theoretical depth and practical experience to prepare the students to become leaders in this revolution.

Dr. Peter Mezine, Director NVIDIA Co-Design Center Zurich, Switzerland

Working in the field of computational science allowed me to study the interface between applied mathematics, computer science and bio-sciences and to direct my research focus according to my own preferences. It is a rewarding feeling to develop algorithms and numerical techniques, implement and optimize them for supercomputers and then see how they help researchers in life science to speed up their work. Being part of a multidisciplinary and international team broadened my perspective and allowed me to significantly extend my professional network. The experience I gathered and qualification I achieved gives me a significant insight into the future and all the possibilities to find my dream job right after graduation.

Donat Krause, Ph.D. Alumnus, now working at Jülich Supercomputing Centre

Computational Science lies at the intersection of mathematics, informatics and natural as well as social sciences and is the latest and most dynamic scientific method aimed at explaining real-world processes and solving increasingly complex problems. The multidisciplinary Computational Science Master programme of the Institute of Computational Science at the University of Lugano offers a streamlined blend of cutting-edge scientific research and practical application, thus providing an excellent foundation for a corporate, industrial or academic career.

Our students receive a firm grounding in programming, mathematical modeling and numerical simulations as well as a strong orientation towards applied mathematics. Our graduates are sought-after experts in data evaluation, data modeling and prognosis. The unique scope of our Master programme creates an exceptionally wide spectrum of occupations for our graduates in a large variety of different application domains.

Programme Description

Our MCS Master programme provides a unique high-level education in computational science. By combining a solid and deep theoretical background in applied mathematics and numerical analysis with state-of-the-art knowledge in computer science and high-performance computing, students will get the best of two worlds: A general and abstract view on computational techniques given by the mathematical framework, and a hands-on and application oriented education in modern informatics and software engineering. With the resources available at ICS and our partners at CSCS, ETH, or C'IT, the students are trained to exploit the power of mathematics and of large supercomputers for real-world simulations in a broad range of application areas.

USI Universität della Svizzera italiana
Institute of Computational Science

Master of Science Programme
Computational Science

Selected Application Domains at ICS

Computational Life Sciences

Computational Engineering

These days, progress in industrial engineering depends strongly on the capabilities provided by methods and tools from computational science. Numerical experiments carried out on high-performance computers are nowadays an indispensable tool in the development of, e.g., new machine parts, mechanical components, or cars. Thus, Computational Science engineering is an area of ever-growing importance for our modern industrial society.

Computational Geoscience

Complex multi-scale interactions characterize the geophysics of the earth. Resolving structures, processes and dynamics on a wide range of interacting spatio-temporal scales is a challenging grand challenge common to all branches of earth science which must be addressed in order to achieve a comprehensive understanding of the earth as a multi-physics system.

Computational Fluid Dynamics

Fluid mechanics is at the heart of many processes in our lives, at scales ranging from motion of cells in microcirculation to the global circulation in the atmosphere and oceans. Understanding fluid mechanics is therefore an important topic of research in the academic world and also in industry. At the moment, many fluid mechanics problems are tractable using classical theoretical approaches. We develop and implement methods for carrying out simulations using state-of-the-art computational systems which otherwise can be the only option to provide an insight into the problems emerging in real-life applications.

Shape recognition and pattern recognition are of central importance in our modern and digitalized world. We develop computational models for 2D and 3D computer vision and pattern recognition applications, thus turning these into high performance computing machines to process, analyze, and understand visual information.

Computational Finance

There is a strong and growing demand in the financial services industry for advanced quantitative computational competences. This includes risk management as well as the analysis of financial data. Numerical methods and tools applicable to risk analysis and in particular to time series analysis are part of our offer.

Bioinformatics

Bioinformatics is an area of ever-growing importance for our modern industrial society. Modern business analytics has become a high-tech industry based on decision modeling, mathematical programming, and complex simulations. There is an intriguing quest for advanced levels of computational simulations and data analytics within the Financial Technology & Discovery Services at Ernst & Young AG, Zurich. This requires not only unconventional ideas but also motivated and well educated students that have a profound knowledge of various disciplines which are offered within the MCS master at USI.

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USI Universität della Svizzera italiana
Institute of Computational Science

Master of Science Programme
Computational Science
Master in Computational Science
Revolutionizing Scientific Discovery.

Computational science offers thrilling new perspectives for understanding complex processes in almost all areas of our life – ranging from natural sciences over economy, finance, and social science to life sciences and medicine. Through numerical simulation and mathematical modeling, computational science made possible what was unthinkable only a few years ago: problems that were impossible to test in an experimental setting were made accessible by developing models that can be solved by increasingly powerful supercomputers. The application domains are as diverse as the scientific disciplines applying models from computational science, with new areas emerging virtually every day in a pioneering interdisciplinary science field.

The graduate Master Programme Computational Science at the Institute of Computational Science welcomes visionaries that are eager to extend the boundaries of knowledge and to set new standards for scientific discovery, research and industrial development, thus shaping the world of tomorrow.

Applications and Admissions
Admissions
Applications for the MCS Programme are open for Fall and Spring Term.

Application Requirements
Learn more at: www.mcs.usi.ch

Application Period and Deadline
Learn more at: www.mcs.usi.ch

Fees
Tuition fees for the Master’s degrees amount to CHF 4,000 per semester. Applicants whose official residence was in Switzerland (including Liechtenstein and Campione d’Italia) at the time of the final high school exam (Maturità) pay a reduced semester fee of CHF 2,000.

Research Assistant Grants
Applications to work as a research student assistant are open. You can be part of a research project and this work will help you financing your studies starting from the first day. For application please send a cv and a letter of intent to the academic director of the ICS at: mcs@usi.ch

USI Grants
Applications are open. 60 one-off study grants of the amount of 4,000 CHF are awarded based on merit.

Further Information
Teaching language is English.
E-mail for general questions regarding the AMCS Master programme: mcs@usi.ch
Visit our website: http://ics.usi.ch
Or visit us on facebook: www.facebook.com/USImcs

Graph visualization to discover and visualize structures in complex relations.