

MASTER OF SCIENCE IN

COMPUTATIONAL SCIENCE

The Master of Science degree in Computational Science (MCS) at the Università della Svizzera italiana (USI) offers students the opportunity to acquire an in-depth understanding and set of skills in computational science, numerical simulation, applied mathematics, statistics, and data science. It provides an innovative combination of methodological and applied competencies in simulation and data science, which endow students with the knowledge and skills that are needed to operate at the forefront of science and industry.

Computational Science is not to be confused with Computer Science, which deals with the science and engineering of computers. Computational Science represents a broader approach to interdisciplinary problems and projects, using computer simulations in model based approaches that represent the interaction between theory and experiment.

GENERAL INFORMATION

Admission Requirements

The MCS is a highly-selective program designed for students with a strong background in mathematics, computer science, and applied statistics. Applicants must hold a bachelor's degree in the field of Computer Science, Mathematics, Physics, Electrical Engineering, Statistics, or related disciplines granted by an accredited university. Applicants with a bachelor's degree in the social sciences with adequate computational and analytical training are also welcome. Further information for applicants graduating from a University of Applied Sciences is available online: www.mcs.usi.ch/admission.

GOALS AND CONTENTS

The Master in Computational Science (MCS) program is an exciting new approach to understanding complex systems in a broad range of knowledge areas including the natural and physical sciences, the social sciences, the life sciences, management science and medical science. By integrating computer simulation, mathematical modeling, numerical analysis, and data analysis, recent developments in computational science are making possible what was unthinkable only a few years ago. Problems that are inaccessible to traditional experimental and empirical methods can now be addressed thanks to new techniques in algorithmic modeling and the increasing speed of modern supercomputers.

The MCS program combines courses from computer science, mathematics, statistics and data analysis to build application-oriented competences in numerical simulation and data science. Students enrolled in the MCS program acquire valuable and much sought-after analytical skills

through direct involvement in modeling projects addressing a wide range of real-world problems spanning many interdisciplinary applications.

For the master's thesis, students can participate in ongoing research projects at the ICS, the IDIDS, or the Faculty of Informatics. Topics include Numerical Analysis, High-Performance Computing, Geo-Science, Computational Engineering, Optimization, Computational (Bio-) Mechanics and Fluid-Mechanics, Computational Medicine, Drug-Design, Computational Finance, or Shape Analysis. Elective courses and the master thesis allow students to tailor their learning experience to their individual interests and professional objectives while creating innovative combinations of knowledge across multiple disciplines.

With the guidance of a personal faculty tutor, students will be encouraged to set up an individual study plan that includes appropriate elective courses. The faculty tutor will advise and accompany students through the entire two-year course of study.

Applicants who are not native English speaker or whose first degree was not taught in English must supply an internationally recognised certificate to demonstrate a C1 level on the Common European Framework of Reference for language learning (CEFR) - e.g. TOEFL, IELTS.

Application deadline

Application deadline is June 30. Application deadline for candidates who need a visa is April 30.

Fees

The tuition fee is CHF 4,000 per semester. Applicants whose official residence was in Switzerland (including Liechtenstein and Campione d'Italia) when graduating from high school (Maturità) pay a reduced semester fee of CHF 2,000.

Grants

You can find a list of several grants offered to USI students on the following website:

www.master.usi.ch/grants.



CAREER PROSPECTS

The interdisciplinary master degree in Computational Science introduces students to the university's blend of innovative scientific research and real world applications, thus providing an excellent foundation for a career in industry and science. Our graduates are ready to pursue professional careers in research, engineering, scientific computing, data science, data and business analytics, computational medicine, and information systems. Successful completion of the MCS also provides preferential access to the PhD in Computational Science offered at the Università della Svizzera italiana. Career opportunities for computational scientists are continuously expanding and changing. The future is very promising for graduates with in-depth knowledge and understanding of mathematical modelling and computer systems. The advanced technical and problem-solving skills developed by our graduates are highly valued by employers.

STUDY PROGRAMME

The Master of Science in Computational Science program consists of four semesters of full-time study (120 ECTS). It offers courses in numerical mathematics and computer science, together with a wide range of more application-oriented courses. It finishes with a master's thesis in the form of a half-year project, worth 30 ECTS, which can be carried out in an industrial or research setting. Selected block courses are taught by professors from other prominent academic institutions and international research centres, e.g., Stanford, Massachusetts Institute of Technology (MIT), University of Erlangen, University of Texas at Austin, University of Warwick, and CSCS. After the successful completion of the programme, students will be awarded a Master of Science in Computational Science.

COURSES

The table below outlines an overview of mandatory and elective courses in the master's program MSc in Computational Science.

FIRST SEMESTER	SECOND SEMESTER	THIRD SEMESTER	FOURTH SEMESTER
Mandatory	Mandatory	Mandatory	Master Thesis 24
Introduction to Differential Equations 9	Optimization and Multiscale Solution Methods 6	Preparation MSc Thesis 6	Data Assimilation 3
Software Atelier: Differential Equation Lab 3	Software Atelier: Simulation, Data Science & Supercomputing 6	Advanced Discretization Methods 6	3 ECTS can be obtained with elective courses chosen from any other Master course offered by the Faculty of Informatics or Economics. 3
Numerical Algorithms 3	Deterministic Methods 6	Stochastic Methods 6	
Statistics 6	Elective (2 out of 4)	Computational Biology & Drug Design 6	
Practice of Simulation & Data Sciences 3	Computational Fluid Dynamics* 3	Elective (2 out of 3)	
High-Performance Computing 6	Node-Level Performance Engineering* 3	Molecular Dynamics 3	Total ECTS 120
	Computational Geophysics* 3	Econometrics 3	
	Software Engineering for Computational Sciences* 3	Large-Scale Optimization 3	
	Elective (1 out of 3)		
	Advanced Computer Architectures 6		
	Geometric Algorithms 6		
	Computer Vision & Pattern Recognition 6		

FACULTY
Informatics

AWARDED DEGREE
Master of Science in
Computational Science

LANGUAGE
English

START OF COURSES
Mid-September

DURATION
4 semesters (2 years)

ECTS
120

APPLICATION DEADLINE
June 30
April 30 (extra EU)

TUITION FEES
CHF 4,000/semester (International)
CHF 2,000/semester (Residents)



www.master.usi.ch

CONTACTS
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INFORMATION
www.mcs.usi.ch