

## Qualification Profile

### Master Program in Computational Science and Engineering (CSE)

#### 1. The subject

The interdisciplinary curriculum in Computational Science and Engineering (CSE) introduced at ETHZ in the autumn of 1997 was one of the first programs of its kind in Europe. This forward-looking educational program is a response to the rapid progress in computer technology and numerical methods which has brought about a fundamental change in both research and industrial development. Numerical simulation (computer experiments) is both replacing and expanding the tools traditionally used in science and engineering, which are practical experiments and theoretical analysis.

Computational science and engineering offers interdisciplinary training in:

- Mathematics (including modelling and numerical algorithms);
- Computer science (including visualization and computer architecture);
- Fields of application from science and engineering.

It includes mathematical modelling, numerical solution techniques and the use of computers to analyse and solve scientific and technological problems. CSE is different from both computer science and traditional science and engineering. It represents a third scientific way in addition to theory and experiment. CSE is interdisciplinary, application oriented and focused on problem solving.

The CSE Master Program follows on from the CSE Bachelor Program offered by ETH. The CSE Master degree makes new, computer-based career profiles accessible to graduates.

#### 2. Career profile, knowledge and skills

Graduates of the Master Program in Computational Science and Engineering

- have in-depth knowledge of numerical analysis and computer science and are also familiar with the concepts and methods used in science and engineering;
- can understand a problem from the scientific and technological point of view and have the requisite skills to perform a computer-based analysis of the problem;
- have studied in depth at least two fields of application from science and engineering;
- can communicate with specialists in physics, chemistry, biology, science and engineering and computer science in their language, and work with them to find computer-based solutions to difficult practical problems;
- have learnt to work in an existing scientific group, to give scientific talks and to write scientific reports;
- are capable of working in an interdisciplinary way;
- are capable of familiarising themselves rapidly and independently with new material.

This interdisciplinary training in mathematics, computer science and applications is an ideal basis for a career in industry and business.