Computer simulations of complex problems play a key role today in scientific studies and engineering design. The Master Program in Computational Science provides you with the opportunity to broaden and deepen your knowledge of natural science or technology with specialisation in computers and mathematical modelling. You will learn to apply computational methods, programmes and software, as well as mathematical and statistical models within your sphere of interest.

Large or small, at the macro or micro level, various phenomena are today studied on a computer screen. To be able to use, develop and apply computer simulations within a certain subject area requires not only a solid background in the actual subject field, such as chemistry or physics, but also computational methods, advanced computers, software, programming, as well as statistical and mathematical models. The Master Programme in Computational Science provides you with this knowledge. Computational science is a multidisciplinary field where issues in areas such as chemistry, biology, physics and geosciences are studied, using advanced computers and software to perform numerical simulations based on mathematical and statistical methods.

**ABOUT THE PROGRAMME**

The multidisciplinary character of computational science is reflected in the contents of the Master Programme in Computational Science. The courses provide knowledge of:

- Advanced multicore computer systems
- Software and programming
- Numerical and statistical computational methods
- Mathematical and statistical models in for example physics, chemistry, biology or geosciences

Some of the characteristic courses of the programme are:

- Computational Physics
- High Performance Computing and Programming
- Optimisation
- Programming of Parallel Computers
- Scientific Visualisation

The precise extent of each component will depend on individual selections. Through the wide range of elective courses the programme can be tailored, taking into account each individual student’s educational background and areas of interest with regard to applications in science. The first course in the program is a bridging course in scientific computing, serving as a bridge between the program and your previous education.

**INSTRUCTION**

Computers are used to study problems within sectors where experiments are expensive or impossible to perform, or where systems are so complicated that simplified assistance models are insufficient. Important examples can be found within the environmental industry and the energy sector. The use of tools based on computer calculations and simulations is currently increasing substantially within companies of different sizes and within many different sectors. Computer simulations can be performed within many areas such as weather forecasts, design of pharmaceuticals, development of new aircraft, or studies of greenhouse effects. Computer simulations play a central role for increased understanding and product development within these areas, as well as in determining performance and other qualities for processes and products, or to optimize design and quality. The interdisciplinary content of the programme provides you with unique skills currently demanded by the labour market. There is an increasing need of qualified manpower that combines scientific knowledge with mathematical modelling and proficiencies in using modern computational scientific tools. This combination is important, and a rapid increase in demand for newly quali-
fied people with such combination is expected over the next ten years – both in Sweden and internationally. The programme also prepares for PhD studies in e.g. computational science, physics, bioscience and mathematics.

DEGREE
The programme leads to a Master of Science (120 credits) with Computational Science as the main field of study.

CAREER
The use of computer simulation as a tool is increasing in industry. This is true especially in fields where experiments are too expensive, dangerous or even impossible to perform. Important examples can be found in the environmental industry or in the energy field. After having completed this programme you will have gained multidisciplinary competence, combining general knowledge in computer simulation and mathematical modelling with skills in using modern computational tools and the knowledge of a selected field of science.

MASTER PROGRAMME IN COMPUTATIONAL SCIENCE 120 credits

APPLICATION
Admission for the autumn semester.
Application deadline is 15 January.
Application through the website www.universityadmissions.se.

REQUIREMENTS
A Bachelor of Science degree (equivalent to a Swedish degree of at least 180 credits, i.e. three years of full-time study), in Science, Engineering, Mathematics or Computer Science, including at least 30 credits in Mathematics, including Algebra, Linear Algebra, Calculus and Vector Calculus, 5 credits in programming and 5 credits in numerical methods (numerical analysis or Scientific Computing).

Proof of skills in English to a level corresponding to English B in Swedish secondary school. This is normally attested by means of an internationally recognised test with the following minimum scores: IELTS: an overall mark of 6.5 and no section below 5.5
TOEFL: Paper-based: Score of 4.5 (scale 1–6) in written test and a total score of 575. Internet-based: Score of 20 (scale 0–30) in written test and a total score of 90
Cambridge: CAE, CPE

SELECTION
Selection will be based on previous academic studies and degrees with emphasis on grades in the field of technology/science, a summary in English (1–2 pages) of a previous degree project (if any), and a statement of intent.

CONTENT
In general, the two-year programme gives a total of 120 credits, which are distributed in the following way over different areas of study (with individual variations):

Year 1
Courses in scientific computing (various aspects of numerical analysis and programming for high-performance computing) 30 credits
Data-Intensive Statistics and Data-Mining 10 credits
Courses in some of the areas of chemistry, physics, biology, geosciences, mathematics or computer science 20 credits

Year 2
Courses in scientific computing (eligible courses, e.g. Scientific Visualisation and Project Course in Applied Scientific Computing) 15 credits
Courses in some of the areas of chemistry, physics, biology, geosciences, mathematics or computer science 15 credits
Master thesis 30 credits

This is a powerful combination and the demand for that type of expertise will increase within a ten-year period.

The professional career may be in scientific or technical research and development, as scientific and/or technical advisor, consultant or project leader. The programme also prepares you for PhD studies in e.g. computational science, physics, bioscience, and mathematics.

FEES AND SCHOLARSHIPS
There is a tuition fee and application fee for students who are not citizens of the EU/EEA or Switzerland. For these students the tuition fee for this programme is SEK 135 000 per academic year. The fee for application to Swedish universities is SEK 900.
Uppsala University offers scholarships to cover the tuition fee, see www.uu.se/scholarships. The Swedish Institute also administers scholarships, www.studyinsweden.se/scholarships.

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