

- Master of Science, Major in Computational Science with specialisation in Physics
- 2 years, full-time, 120 ECTS credits
- Centre for Mathematical Sciences
- Lund Campus
- Application deadline: January 2024
- Programme start: August 2024

PROGRAMME OVERVIEW

Are you interested in combining computational science with the fascinating world of physics? This Master's programme gives you specialist knowledge in how to use numerical simulations and machine learning to make forecasts and analyses, or to replace experiments. You can learn how to generate and store large amounts of data and use data science to search for patterns, connections, and trends in issues related to physics. Advanced computations are increasingly important in research and business. In this Master's programme you will learn how to study complex processes within physics, and how computational science can contribute to knowledge evolution in society. Computational physics is a branch of computational science in which analytical, numerical and statistical methods are used to analyse and draw conclusions from physics models and large data sets from physics experiments. Examples of focus areas are accelerator physics, cell dynamics, supernovas and environmental and climate change.

The programme will prepare you for a professional career in academia as well as in business and industry. In addition to theory for computational science, there will be an emphasis on obtaining knowledge about the practical tools that are used by professionals in the field, including training your skills in programming. You will get general knowledge and skills of importance for computationally intensive professions, such as problem formulation, searching information, data processing, scientific writing, and presentation techniques.

The Master's programme gives you specialised knowledge in the field of computational science, while also being interdisciplinary in character. Participating students have a background in maths/physics and an interest in mathematics and programming, but you will take courses alongside students from other specialisations. In this context, there will be a chance to conduct joint projects and degree projects. The programme has strong ties with research. You will be taught by internationally well-recognised researchers, and you will be in contact with several research groups. The programme is taught in English.

PROGRAMME MODULES/COURSES

You can read this Master's programme even if you do not have a Bachelor's degree in physics. In this case, the course structure gives you a general education in physics at first and second-cycle level, focusing on the interaction between numerical methods and theoretical models. If you already have a Bachelor's degree in physics, you will deepen your knowledge in the subject with a particular focus on areas that require computational science methods.

If you do not have a Bachelor's degree in physics, the first year of study includes five compulsory courses: modelling in computational science, basic quantum mechanics, basic statistical physics and quantum statistics, atomic and molecular physics and numerical methods for differential equations. If you already have a Bachelor's degree in physics, you take only two of these courses and build on them with courses such as stationary stochastic processes, advanced electromagnetism, Monte Carlo methods for statistical inference, and numerical simulations of flow problems. The degree project is worth 30 credits.

CAREER PROSPECTS

Graduates of the programme can embark on several different career paths. The Master's programme gives you a solid foundation for third-cycle education in the natural sciences, or a career within industry or business. You can thus also choose a career path outside academia and then find attractive jobs in areas where there is a need to solve natural science problems with the help of statistics, data processing or simulations, in industry or in public administration and other organisations.

ENTRY REQUIREMENTS AND HOW TO APPLY

Entry Requirements

Bachelor's degree in Physics of at least 180 credits.

Proficiency in English equivalent to English 6/B from Swedish upper-secondary school.

or

Bachelor's degree of at least 180 credits in Science or Engineering. The degree should contain at least 30 credits mathematics, of which 6 credits in programming and 7.5 credits in statistics, and an additional 90 credits in mathematics and/or physics.

For details on English proficiency levels, see www.lunduniversity.lu.se

How to apply

1. **Apply online:** Go to www.lunduniversity.lu.se/computational-science-physics. Click on "Apply" and follow the



instructions for the online application at www.universityadmissions.se, the Swedish national application website. Rank the chosen programmes in order of preference.

2. Submit your supporting documents:

- **General supporting documents** : Check what documents you need to submit (i.e. official transcripts, degree diploma/proof of expected graduation, translations, proof of English, passport) and how you need to submit them at www.universityadmissions.se.
- **Programme-specific supporting documents**: When applying for this programme, you must also submit a 'Summary Sheet' with your application. See the programme webpage for details.

3. Pay the application fee (when applicable).

Selection criteria/additional info

The selection will be based on grades awarded for previous academic courses in science, engineering and mathematics, as well as the statement of purpose clarifying the applicant's objective with the programme (from the applicant's "Summary Sheet").

Tuition fees

Tuition fee SEK 170 000 per year for non-EU/EEA citizens. No fee for EU/EEA citizens. See www.lunduniversity.lu.se for details on tuition fees.

ABOUT THE CENTRE FOR MATHEMATICAL SCIENCES

The Centre for Mathematical Sciences is both part of the Faculty of Science and of the Faculty of Engineering. The Centre consists of approximately 120 employees. We carry out research

and teaching in mathematics, mathematical statistics and scientific computing. The personnel of the Centre can be clustered according to different non-disjoint criteria, e.g. according to title, faculty, subject or research groups. The three administrative divisions are: Mathematics (Faculty of Science), Mathematics and Numerical Analysis (Faculty of Engineering) and Mathematical Statistics).

ABOUT LUND UNIVERSITY

Lund University was founded in 1666 and is repeatedly ranked among the world's top universities. The University has around 45 000 students and more than 8 000 staff based in Lund, Helsingborg and Malmö. We are united in our efforts to understand, explain and improve our world and the human condition.

Lund is considered one of the most popular study locations in Sweden. The University offers one of the broadest ranges of programmes and courses in Scandinavia, based on cross-disciplinary and cutting-edge research. The unique disciplinary range encourages boundary-crossing collaborations both within academia and with wider society, creating great conditions for scientific breakthroughs and innovations. The University has a distinct international profile, with partner universities in approximately 75 countries.

Lund University has an annual turnover of EUR 892 million, of which two-thirds go to research in our nine faculties, enabling us to offer one of the strongest and broadest ranges of research in Scandinavia.

CONTACT

Programme webpage:

www.lunduniversity.lu.se/computational-science-physics

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