



FACULTY OF SCIENCE

Programme sheet

Master Programme in Applied Computational Science, Environmental Science, 120 credits

September 2023 – June 2025

Computations are becoming more and more important in research and industry. To make predictions, analysis or to replace experiments, we make use of numerical simulations and machine learning on large computers. We generate and store large amounts of data and use data science to search for patterns, connections, and trends.

The Master Programme in Applied Computational Science with specialisation in Environmental Science will give you detailed knowledge about the underlying methods with respect to environmental science. You will learn how to study complex processes in natural sciences, and how Computational Science can contribute to knowledge evolution in society. A few of many examples are studies in, and research on, environment and climate change, climate adaptation, biodiversity and ecosystem services, nature conservation and chemical risks. The programme will prepare you for a professional career in academia as well as in business and industry. Applied computational science can be divided into several components: mathematics, modelling, statistics, and programming. The borders are not sharp, as concepts and methods often combine these components. The programme will prepare you for a professional career in academia as well as in business and industry.

Programme overview

This interdisciplinary education will give you in-depth knowledge in the field of computational science, but you also study advanced courses based on your subject knowledge in environmental science from your bachelor's degree. In addition to knowledge of theory of computational science, there will be an emphasis on obtaining knowledge about the practical tools that are used by professionals in the field and you will amongst several things train your skills in programming. You will get generic knowledge and skills of importance for computationally intensive jobs such as problem formulation, information search, data processing, scientific writing, and presentation techniques.

The programme has five separate tracks: Environmental Science, Biology, Geology, Physical Geography and Chemistry. You will study several courses together with students from another track than your own and there are possibilities to do common projects and thesis work. During your studies, an interdisciplinary perspective is emphasized and you will even study together with students from mathematics and physics.

The education has a strong connection to research. You will meet and be taught by active and internationally well recognized researchers, and you will be in contact with several research groups. You will at the same time be prepared for a career in business and industry.

Programme structure

In the first year of the track Environmental Science, you study basic courses in mathematics, statistics and programming which will give you knowledge to conduct projects in computational science. Then you go deeper into applied computational science and in environmental science with courses that builds on your bachelor exam.

The second year your study courses in “modelling in computational science” and “reproducible data science and statistical learning”. The parts of the education with non-mandatory courses include courses such as ecosystem modelling, Bayesian methods or introduction to artificial neural networks and deep learning. The last semester is reserved for the master's thesis.

Compulsory courses 60 credits

MVEN13	Analysis and Methodology, 15 credits
MATA04	Mathematics for Scientists 2, 15 credits
MASB11	Biostatistics - Basic Course 7.5 credits
NUMA01	Computational Programming with Python, 7.5 credits
BERN01	Modelling in Computational Science, 7.5 credits
BERN01	Reproducible Data Science and Statistical Learning 7.5 credits

Elective courses, at least 30 credits

NGEN02	Ecosystem Modelling, 15 credits
STAE02	Bayesian Methods, 7.5 credits
FYTN14	Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits
BIOR52	Applied Ecotoxicology, 15 credits
BIOR83	Conservation Biology, 15 credits
MVEP10	Applied Work, 15 credits
BIOS13	Modelling Biological Systems, 7.5 credits
BERN03	Introduction to Modelling of Climate Systems 7.5 credits
BIOS14	Processing and Analysis of Biological Data, 7.5 credits

Degree project 30 credits

BERMXX	Degree project Master of Science, 30 credits
--------	--

Table 1 Course of study, example

Year 1	Autumn 1	Autumn 2	Spring 1	Spring 2
	MVEN13 Analysis and Methodology, 15 credits	MATA04 Mathematics for Scientists 2, 15 credits	NGEN02 Ecosystem Modelling, 15 credits	MASB11 Biostatistics, 7.5 credits
				NUMA01 Computational Programming with Python, 7.5 credits

Year 2	Autumn 1	Autumn 2	Spring 1	Spring 2
	BERN01 Modelling in Computational Science, 7.5 credits	STAE02 Bayesian Methods, 7.5 credits	Degree project Master of Science, 30 credits	
	BERN02 Reproducible Data Science and Statistical Learning, 7.5 credits	FYTN14 Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits		

Career opportunities

After graduation, there are several different career paths depending on which subject profile you have chosen. The Master's programme gives you a solid ground for postgraduate education in natural sciences. You can also choose a career path outside academia and then find attractive jobs in areas where there is a need to solve computational problems both in industry and in public administration and other organisations.

Requirements and selection

Entry requirements

Bachelor's degree of at least 180 credits, including 90 credits in science of which 15 credits should be in mathematics and 30 credits should be in environmental science.

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

Selection criteria

Seats are allocated according to: Previous college/university studies (HPAV): 100 %.

Degree

Master of Science

Major: Applied Computational Science with specialisation in Environmental Science

Naturvetenskaplig masterexamen

Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i miljövetenskap

Application

Apply online using [Universityadmissions.se](https://www.universityadmissions.se)

Application period: 17 October 2022 - 16 January 2023

Language of instruction: English

Contact

Master coordinator Stefan Olin, stefan.olin@nateko.lu.se