



FACULTY OF SCIENCE

Programme sheet

Master Programme in Applied Computational Science, Geology, 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 Geology will give you detailed knowledge about the underlying methods with respect to geology. 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 on different timescales and associated changes in plant and animal distributions and the world's oceans, lakes and wetlands. 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 physical geography 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 specialisations: Environmental Science, Biology, Geology, Physical Geography and Chemistry. You will study several courses together with students from another specialisation 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 specialisation Geology, you study 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 geology with courses that builds on your bachelor exam.

The second year you study courses in “modelling in computational science” and “introduction to modelling of climate systems”. 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 67,5 credits

GEOM10	Sedimentary Geology and Basin Analysis, 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

BERN02 Reproducible Data Science and Statistical Learning, 7.5 credits

BERN03 Introduction to Modelling of Climate Systems 7.5 credits

Elective courses, at least 22.5 credits

[GEON08](#) Marine Geology and Environmental Change, 15 credits

[GEOM08](#) Metamorphic Petrology and Structural Geology, 15 credits

[GEON09](#) Global environmental change from a geological perspective, 15 credits

[GEOM09](#) Evolution of the Biosphere, Palaeoecology and Palaeontology, 15 credits

[NGEN02](#) Ecosystem Modeling, 15 credits

[STAE02](#) Bayesian Methods, 7.5 credits

[FYTN14](#) Introduction to Artificial Neural Networks and Deep Learning, 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
	GEOM10 Sedimentary Geology and Basin Analysis, 15 credits	MATA04 Mathematics for Scientists 2, 15 credits	GEON08 Marine Geology and Environmental Change, 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	BERN03 Introduction to Modelling of Climate Systems, 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 75 credits should be in geology.

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 Geology

Naturvetenskaplig masterexamen

Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i geologi

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