



FACULTY OF SCIENCE

Programme sheet

Master Programme in Applied Computational Science, Biology, 120 credits

September 2024 – June 2026

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 Biology will give you detailed knowledge about the underlying methods with respect to biology. 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 biology 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 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 biology specialisation, you will start studying courses in bioinformatics focusing on data handling and programming. You will also do a course in basic mathematics that will give you knowledge to conduct projects in computational science. Then you will have the possibility to go deeper into biology and ecosystem modelling, 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” as well as courses in “modelling biological systems” and “data handling and analysis of biological data”. The last semester is reserved for the master's thesis.

Compulsory courses 60 credits

BINP11	Bioinformatics and sequence analysis, 7.5 credits
BINP16	Bioinformatics, Programming in Python, 7.5 credits
MATA04	Mathematics for Scientists II, 15 credits
BERN01	Modelling in Computational Science, 7.5 credits

- [BERN02](#) Reproducible Data Science and Statistical Learning, 7.5 credits
- [BIOS13](#) Modelling Biological Systems, 7.5 credits
- [BIOS14](#) Processing and Analysis of Biological Data, 7.5 credits

Elective courses, at least 30 credits

- [NGEN02](#) Ecosystem Modelling, 15 credits
- [STAE02](#) Bayesian Methods, 7.5 credits
- [BIOR52](#) Applied Ecotoxicology, 15 credits
- [BIOR83](#) Conservation Biology, 15 credits
- [BIOR25](#) Molecular Ecology and Evolution, 15 credits
- [BIOR39](#) Biological Monitoring, 15 credits
- [BIOR84](#) Cellular and Molecular Neurobiology, 15 credits
- [BERN03](#) Introduction to Modelling of Climate Systems 7.5 credits
- [BIOR92](#) Genetic analysis, 7.5 hp
- [BIOS08](#) Microscopy – Bio-imaging, 7.5 hp
- [BIOR93](#) Applied Bioinformatics, 7.5 hp
- [BIOR14](#) Pharmacology, 15 hp
- [BIOR85](#) Immunology, 15 hp

Autumn courses

- [BIOR41](#) Ecotoxicology, 15 hp
- [BIOR89](#) Evolution biology – Patterns and Processes, 15 hp
- [BIOR69](#) Population and Community Ecology, 15 hp

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
	BINP11 Bioinformatics and sequence analysis, 7.5 credits	MATA04 Mathematics for Scientists 2, 15 credits	BIOR83 Conservation Biology, 15 credits	BIOR39 Biological Monitoring, 15 credits
	BINP16 Bioinformatics, Programming in Python, 7.5 credits		BIOR25 Molecular Ecology and Evolution, 15 credits	BIOR84 Cellular and Molecular Neurobiology, 15 credits

Year 2	Autumn 1	Autumn 2	Spring 1	Spring 2
	BERN01 Modelling in Computational Science, 7.5 credits	BIOS13 Modelling Biological Systems, 7.5 credits	Degree project Master of Science, 30 credits	
	BERN02 Reproducible Data Science and Statistical Learning, 7.5 credits	BIOS14 Processing and Analysis of Biological Data, 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 must be in mathematics, 60 credits in biology and 7.5 credits in statistics.

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 Biology

Naturvetenskaplig masterexamen

Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i Biologi

Application

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

Application period: 17 October 2023 - 16 January 2024

Language of instruction: English

Contact

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