



Faculty of Science

NATBE, Master Programme in Applied Computational Science, 120 credits

Masterprogram i tillämpad beräkningsvetenskap, 120 högskolepoäng

Second cycle degree programme requiring previous university study / Program med akademiska förkunskapskrav och med slutlig examen på avancerad nivå

Decision

The syllabus was approved by The Board of Faculty of Science on 28-09-2022 (U 2022/611) and was last revised on 17-12-2025 by The Board of Faculty of Science (STYR 2025/936). The revised syllabus comes into effect 19-01-2026 and is valid from the spring semester 2026.

Specialisations

Code	Swedish name	English name	Credits
TBBO	Biologi	Biology	120 credits
TAKM	Kemi	Chemistry	120 credits
TBMI	Miljövetenskap	Environmental Science	120 credits
TBGE	Geologi	Geology	120 credits
TBNG	Naturgeografi	Physical Geography	120 credits

Programme description

The programme for a degree of Master of Science specialising in Applied Computational Science comprises 120 credits and leads to a degree of Master of Science (120 credits) with a major in Applied Computational Science.

The programme is based on scholarship and is closely linked to research conducted at the Lund University Faculty of Science. The operations at the faculty uphold academic credibility and good research practice and are arranged to ensure that high standards are attained in courses and study programmes. Furthermore, the operations promote

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sustainable development, equality between women and men and understanding of other countries and international circumstances. These aspects are integrated in the degree outcomes of the programme.

Second-cycle courses and study programmes in the main field of Applied Computational Science are fundamentally based on the knowledge acquired by students during first-cycle courses and study programmes.

Second-cycle courses and study programmes in the main field of Applied Computational Science involve the acquisition of specialist knowledge, competence and skills in relation to first-cycle courses and study programmes, and in addition to the requirements for first-cycle courses and study programmes shall:

- further develop the ability of students to integrate and make autonomous use of their knowledge,
- develop the students' ability to deal with complex phenomena, issues and situations, and
- develop the students' potential for professional activities that demand considerable autonomy, or for research and development work.

The programme applies a learning perspective, in which students take an active role in the learning process, and consciously and continuously reflect on their learning and development towards the degree outcomes.

The appendix Achievement of learning outcomes for a degree of Master of Science with a major in Applied Computational Science at the Faculty of Science describes the disciplinary foundation and links to research of the programme.

Goals

Knowledge and understanding

For a Degree of Master (120 credits) the student shall

- demonstrate knowledge and understanding in the main field of study, including both broad knowledge of the field and a considerable degree of specialised knowledge in certain areas of the field as well as insight into current research and development work, and
- demonstrate specialised methodological knowledge in the main field of study.

Competence and skills

For a Degree of Master (120 credits) the student shall

- demonstrate the ability to critically and systematically integrate knowledge and analyse, assess and deal with complex phenomena, issues and situations even with limited information
- demonstrate the ability to identify and formulate issues critically, autonomously and creatively as well as to plan and, using appropriate methods, undertake advanced tasks within predetermined time frames and so contribute to the formation of knowledge as well as the ability to evaluate this work
- demonstrate the ability in speech and writing both nationally and internationally to clearly report and discuss his or her conclusions and the knowledge and arguments on which they are based in dialogue with different audiences, and
- demonstrate the skills required for participation in research and development

work or autonomous employment in some other qualified capacity.

Judgement and approach

For a Degree of Master (120 credits) the student shall

- demonstrate the ability to make assessments in the main field of study informed by relevant disciplinary, social and ethical issues and also to demonstrate awareness of ethical aspects of research and development work
- demonstrate insight into the possibilities and limitations of research, its role in society and the responsibility of the individual for how it is used, and
- demonstrate the ability to identify the personal need for further knowledge and take responsibility for his or her ongoing learning.

Independent project (degree project)

A requirement for the award of a degree of Master (120 credits) is completion by the student of an independent project (degree project) for at least 30 credits in the main field of study. The degree project may comprise less than 30 credits, however no less than 15 credits, if the student has already completed an independent project in the second cycle for at least 15 credits in the main field of study or the equivalent from a programme of study outside Sweden.

Course information

The programme comprises 2 years for a degree of Master (120 credits). The appendix Achievement of learning outcomes for a degree of Master of Science with a major in Applied Computational Science at the Faculty of Science describes the courses included.

A Degree of Master (120 credits) is awarded after the student has completed the courses required. In addition, the prior award of a Degree of Bachelor of at least 180 credits or a corresponding qualification from abroad is required. To acquire the fundamentally based advanced knowledge and understanding, competence and skills as well as judgement and approach required to meet the learning outcomes for a degree of Master of Science (120 credits) with a major in Applied Computational Science, new knowledge building upon the underlying Bachelor's degree is necessary.

Additional information in appendix Appendix 1_Programme Structure and course requirements for Master Programme in Applied Computational Science, 120 credits.

Degree

Degree titles

Degree of Master of Science (120 credits)

Major: Applied Computational Science with specialization in Biology

Major: Applied Computational Science with specialization in Chemistry

Major: Applied Computational Science with specialization in Environmental Science

Major: Applied Computational Science with specialization in Geology

Major: Applied Computational Science with specialization in Physical Geography

*Naturvetenskaplig masterexamen**Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i biologi**Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i geologi**Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i kemi**Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i miljövetenskap**Huvudområde: Tillämpad beräkningsvetenskap med fördjupning i naturgeografi***Requirements and Selection method****Biology****Requirements**

Bachelor's degree of at least 180 credits, including 90 credits in science of which 15 credits must be in mathematics, 7.5 credits in statistics, 60 credits in biology including cell biology, and genetics and/or ecology.

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

Selection method

Based on grades awarded for previous academic courses, with majors in science, technology and mathematics, as well as a statement of purpose for the application in which applicants state their goals with the programme (from the applicant's "Summary sheet").

Chemistry**Requirements**

Bachelor's degree of at least 180 credits, including 90 credits in science of which 15 credits should be in mathematics and 45 credits should be in chemistry of which 15 credits should be in physical chemistry.

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

or

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 physics.

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

Selection method

Based on grades awarded for previous academic courses, with majors in science, technology and mathematics, as well as a statement of purpose for the application in which applicants state their goals with the programme (from the applicant's "Summary sheet").

Environmental Science**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 method

Based on grades awarded for previous academic courses, with majors in science, technology and mathematics, as well as a statement of purpose for the application in which applicants state their goals with the programme (from the applicant's "Summary sheet").

Geology

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 method

Based on grades awarded for previous academic courses, with majors in science, technology and mathematics, as well as a statement of purpose for the application in which applicants state their goals with the programme (from the applicant's "Summary sheet").

Physical Geography

Requirements

Bachelor's degree of at least 180 credits, including 90 credits in science of which 15 credits should be in mathematics.
Proficiency in English equivalent to English 6/B from Swedish upper-secondary school.

Selection method

Based on grades awarded for previous academic courses, with majors in science, technology and mathematics, as well as a statement of purpose for the application in which applicants state their goals with the programme (from the applicant's "Summary sheet").

Other information

Some of the optional courses within the program may have higher requirements in mathematics or in other natural science subjects.

Rules pertaining to grades and examination are stated in the course syllabi approved by the Faculty Board.



FACULTY OF SCIENCE

Appendix 1 for programme syllabus,
NATBE Master Programme in
Applied Computational Science, 120
credits

Reg. No.
STYR 2024/322

Centre for Mathematical Sciences

Date 2024-05-23

Programme Structure and course requirements for Master Programme in Applied Computational Science, 120 credits

The programme comprises two years of full-time studies (120 credits) and leads to a degree of Master of Science with a major in Applied Computational Science. The degree can be pursued through several specialisations, each with its associated study path and leads to a degree of Master of Science with major in Applied Computational Science with a specialization in Biology, or a specialization in Chemistry, or a specialization in Environmental Science or a specialization in Geology or a specialization in Physical Geography.

Specialisations

- Biology
- Chemistry
- Environmental Science
- Geology
- Physical Geography

Biology

Mandatory courses

Mandatory courses of 52.5 credits.

BINP17 Bioinformatics and sequence analysis, 7.5 credits
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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

Elective courses

Elective courses of 37.5 credits.

One of the two following courses are recommended

BIOS15 Processing and Analysis of Biological Data, 7.5 credits OR
 BERN04 Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits

Below is a selection of courses that are possible to include in the programme, but check the requirements.

MASM22 Linear and Logistic Regression, 7.5 credits
 STAE02 Bayesian Methods, 7.5 credits
 BIOR83 Conservation Biology, 15 credits
 NGEN42 Ecosystem Modelling, 15 credits
 BIOR25 Molecular Ecology and Evolution, 15 credits
 BIOR84 Cellular and Molecular Neurobiology, 15 credits
 BIOR92 Genetic analysis, 7.5 hp
 BIOS08 Microscopy – Bio-imaging, 7.5 hp
 BIOR85 Immunology, 15 hp
 BIOR14 Pharmacology, 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

Degree project of 30 credits.

BERM04, Applied Computational Science - Biology: Master's Degree Project, 30 credits

Chemistry

Mandatory courses

Mandatory courses of 60 credits.

KEMM30 Molecular Driving Forces and Chemical Bonding, 15 credits
 MATA04 Mathematics for Scientists 2, 15 credits
 MASB21 Biostatistics - Basic Course 7.5 credits
 NUMA01 Computational Programming with Python, 7.5 credits
 BERN01 Modelling in Computational Science, 7.5 hp
 BERN02 Reproducible Data Science and Statistical Learning, 7.5 credits

Elective courses

Elective courses of 30 credits.

KEMM48 Statistical Thermodynamics and Molecular Simulation, 7.5 credits
 KEMM58 Molecular Quantum Mechanics, 7.5 credits
 KEMM87 Advanced Surface and Colloid Chemistry, 15 credits
 MNXB11 Introduction to Programming and Computing for Scientists, 7.5 credits
 FYSN27 Quantum Mechanics, 7.5 credits
 FYST57 Chaos for Science and Technology, 7.5 credits
 BERN04 Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits
 BERN03 Introduction to Modelling of Climate Systems, 7.5 credits
 STAE02 Bayesian Methods, 7.5 credits
 KEMM67 Scattering Methods, 7.5 credits
 KEMM57 Magnetic Resonance - Spectroscopy and Imaging, 7.5 credits
 KEMM29 Molecular Spectroscopy - Methods and Applications, 15 credits
 FYST19 Physics and Chemistry of Surfaces, 7.5 credits

Degree Project

Degree project of 30 credits.

BERM06, Applied Computational Science - Chemistry: Master's Degree Project, 30 credits

Geology

Mandatory courses

Mandatory courses of 67,5 credits.

GEOM20 Methods in Geoscience, 15 credits
 MATA04 Mathematics for Scientists 2, 15 credits
 MASB21 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

Elective courses of at least 22,5 credits.

GEON09 Global environmental change from a geological perspective, 15 credits
 GEOM09 Evolution of the Biosphere, Palaeoecology and Palaeontology, 15 credits
 NGEN42 Ecosystem Modeling, 15 credits
 STAE02 Bayesian Methods, 7.5 credits
 BERN04 Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits
 GEOP07 Hydrogeology, 15hp

Degree Project

Degree project 30 credits.

BERM05, Applied Computational Science - Geology: Master's Degree Project, 30 credits

Environmental Science

Mandatory courses

Mandatory courses of 60 credits.

MVEN10 Risk Assessment in Environment and Public Health, 15 credits
 MATA04 Mathematics for Scientists 2, 15 credits
 MASB21 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

Elective courses

Elective courses of at least 30 credits.

NGEN42 Ecosystem Modelling, 15 credits
 STAE02 Bayesian Methods, 7.5 credits
 BERN04 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
 BIOS15 Processing and Analysis of Biological Data, 7.5 credits

Degree Project

Degree project of 30 credits.

BERM07, Applied Computational Science - Environmental Science: Master's Degree Project, 30 credits

Physical Geography

Mandatory courses

Mandatory courses of 75 credits.

NGEN14 Greenhouse Gases and Biogeochemical Cycles, 15 credits
 MATA04 Mathematics for Scientists 2, 15 credits
 NGEN42 Ecosystem Modelling, 15 credits
 MASB21 Biostatistics - Basic Course 7.5 credits
 NUMA01 Computational Programming with Python, 7.5 credits
 BERN01 Modelling in Computational Science, 7.5 credits
 BERN03 Introduction to Modelling of Climate Systems 7.5 credits

Elective courses

Elective courses of at least 15 credits.

Recommended courses

BERN02 Reproducible Data Science and Statistical Learning, 7.5 credits
 BERN04 Introduction to Artificial Neural Networks and Deep Learning, 7.5 credits

Below is a selection of courses that are possible to include in the programme but check the requirements.

STAE02 Bayesian Methods, 7.5 credits
 BIOS13 Modelling Biological Systems, 7.5 credits
 BIOS15 Processing and Analysis of Biological Data, 7.5 credits

Degree Project

Degree project of 30 credits.

BERM08, Applied Computational Science - Physical Geography: Master's Degree Project, 30 credits
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