1 Name and Scope of the Study Programme
The programme is provided by the University of Skövde and is named Systems Biology with specialization in Bioinformatics - Master’s Programme. It comprises 120 credits.

2 General Objectives
Courses and study programmes on the advanced level shall involve the acquisition of specialist knowledge, competence and skills in relation to courses and study programmes on the basic level, and in addition to the requirements for courses and study programmes on the basic level 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 considerably autonomy, or for research and development work.

(Objectives for courses and study programmes on the advanced level, The Higher Education Act)

3 Programme Objectives
Main area of education is Systems Biology.

Objectives for Master’s Degree according to the Higher Education Ordinance

Knowledge and Understanding
For a Master’s Degree students shall be able to

- show knowledge and understanding within the main area of the education, inclusive of wide knowledge within the area, a considerable in depth knowledge within certain parts of the area as well as deeper insight into current research and development, and
- show in depth knowledge of methodology within the main area of the education.

Proficiency and Ability
For the Master’s Degree students shall

- show the ability to critically and systematically integrate knowledge and analyse, assess and manage complex phenomena, questions and situations even with limited information,
- show the ability to critically independently and creatively identify and formulate questions, as well as to plan and, with adequate methods, carry out advanced assignments within specified time limits and thereby contribute to the development of knowledge as well as to evaluate these efforts,
- show the ability in both national and international contexts to, orally and in writing, clearly account for and discuss their conclusions and the knowledge and arguments these are based on in dialogue with different groups, and
- show the proficiency required to participate in research and development in other advanced activity.

Ability to Evaluate and Relate
For the Master’s Degree students shall
• show the ability, within the main area of the education, to make assessments in accordance with relevant research, societal and ethical aspects as well as show awareness of ethical aspects in research and development,

• show insight into the possibilities and limitations of research, its role in society and human beings’ responsibility for how it is used, and

• show the ability to identify the need for further knowledge and to take responsibility for the development of their knowledge.

**Local Objective for the Programme at The University of Skövde**

Students shall after completion of the programme be able to demonstrate

• deeper knowledge of how methods from systems biology and bioinformatics can be used in combination to process and analyze large-scale data generated by experiments in molecular biology,

• good knowledge and understanding of how digitalization can be used in the pursuit of improved public health and well-being, and

• knowledge and understanding of how digitalization can contribute to sustainable development by resource-efficient usage of data generated by experiments in molecular biology and biomedicine.

### 4 Programme Content

The initial study term of the programme is focused on developing skills in analysis of data using methods from bioinformatics and bioscience, and developing the ability to write computer code for such tasks in Python and R. An introduction of recent research topics in bioinformatics and systems biology is given, and the ability to critically assess scientific articles is practiced.

The second study term gives a broader insight into application areas of systems biology and methods for building models of biological systems. Special emphasis is placed on applications in analysis of networks and pathways. In parallel with this, the knowledge of statistical analysis is further developed, as well as the ability to use the R programming language for bioinformatical analyzes.

The third term focuses on NGS, i.e. methods for massively parallel sequencing, and methods for analysis of data from such experiments in applications of bioinformatics and systems biology. Students begin their dissertation projects during the second half of the third term, mainly by performing the planning phase of the project.

The programme is completed by performing a dissertation project comprising 45 credit units, where the gained knowledge should be applied by independently formulating and solving a research problem in systems biology.

The tuition consists mostly of lectures, seminars, computer laboratory exercises and project supervision.

**The following courses are included in the programme**

- Analysis of NGS Data 1 A1N, 4hp
- Bioinformatics Analysis med R A1N, 7,5 hp
- Bioinformatics - Concepts and Methods A1N, 7,5 hp
- Experimental Design and Data Analysis for Life Science A1N, 5 hp
- Python programming for bioinformatics A1N, 10 hp
- Analysis of NGS Data 2 A1F, 6hp
- Current Research in Systems Biology and Bioinformatics A1F, 7,5 hp
- Multivariate Biological Analysis with R A1F, 7,5 hp
- NGS Library: Preparation and Quality Control A1F, 5 hp
- Network and Pathway Analysis A1F, 7,5 hp
- Systems Biology A1F, 7,5 hp
- Master Degree Project in Systems Biology A2E, 45 hp

### 5 Admission Requirements

To be eligible for the program a Bachelor’s Degree (equivalent to a Swedish Bachelor’s Degree) with a major in the biological or medical area is required. The biological area can be defined as e.g. Molecular Biology, Biochemistry, Microbiology or Physiology. The
medical area is here defined as Biomedicine.

A further requirement is proof of skills in English equivalent of studies at upper secondary level in Sweden known as English course 6 / English course B. This is normally demonstrated by means of an internationally recognized test, e.g. IELTS or TOEFL or the equivalent.

The above admission requirements apply for admission to the programme. For further studies within the programme, the admission requirements for each course must be complied with. These admission requirements are specified in each separate course syllabus.

6 Degree
A student who passes the courses in the programme fulfills the requirements for obtaining a Degree of Master of Science (120 credits) with a major in Systems Biology.

Degrees are awarded after application. Information about how to submit an application can be found on the University’s website.

7 Approval of Study Programme and Programme Syllabus
The study programme was approved by the Vice-Chancellor at the University of Skövde on 19 May 2020. This programme syllabus was approved by the Faculty Board at the University of Skövde on 23 June 2020. It is valid from the autumn semester of 2021.

8 Changes to the Programme Syllabus
The programme studies are carried out in accordance with the current programme syllabus in effect at the time when the studies were initiated, provided that the structure of the programme is followed and that no leave of studies has been granted.

In the event of continued studies after a period of approved leave of studies, the student is to follow the programme syllabus in effect the term that the student resumes his/her studies. If substantial changes to the programme syllabus have been made, the student may contact a student and career counsellor in order to set up an individual study plan.

Reservations are made for the fact that the programme syllabus and its courses are subject to change, within the framework of the objectives of the programme.

9 Additional Information
The teaching is conducted in English.

Further information about the study programme will be available on the University’s web pages prior to a programme start.

National and local regulations for higher education are available on the University’s website.

During the programme, as well as after its completion, there are follow-ups. The main purpose of these follow-ups is to contribute to improvements of the programme. The students’ experiences and views constitute one of the criteria for the follow-up and are gathered by means of programme evaluations. The students will be informed of the results of the follow-up and any decisions regarding actions that are to be taken.