Bioinformatics

Bioinformatik
6 credits

Single subject and programme course

732A51

Valid from: 2025 Autumn semester

Determined by	**Main field of study**	
The Quality Board at the Faculty of Arts and Sciences	Statistics	
Date determined	**Course level**	**Progressive specialisation**
2014-11-18	Second cycle	A1F
Revised by	**Disciplinary domain**	
Chairman of the Course and Programme Syllabus Board at the Faculty of Arts and Sciences	Technology	
Revision date	**Subject group**	
2024-04-23; 2024-09-30	Statistics	
Offered first time	**Offered for the last time**	
Autumn semester 2015		
Department	**Replaced by**	
Institutionen för datavetenskap		

Course offered for

- Master's Programme in Statistics and Machine Learning

Entry requirements

- Bachelor's degree equivalent to a Swedish Kandidatexamen of 180 ECTS credits in one of the following subjects:
    - statistics
    - mathematics
    - applied mathematics
    - computer science
    - engineering
- Completed courses in
    - calculus
    - linear algebra
    - statistics
    - programming
- English corresponding to the level of English in Swedish upper secondary education (Engelska 6)
  Exemption from Swedish
- At least 24 ECTS credits passed in the main field of Statistics at second cycle and at least 5 ECTS credits passed in the main field of Computer Science at second cycle

Intended learning outcomes

After completing the course, the student shall be able to

- Explain concepts in molecular biology and have a primary understanding of various techniques used to generate data.
- Explain important algorithms and principles for statistical models used for the analysis of high-dimensional molecular data.
- Apply some of the most important computer programs in bioinformatics and statistics to molecular data examples.

The teaching consists of lectures and computer exercises. In addition, the student should engage in self-study. The language of instruction and examination is English.

Course content

The course introduces basic molecular biology concepts and how to analyze data with bioinformatics and statistics. More specifically, the course includes:

- Basics of molecular biology and genetics
- Hidden Markov models, genetic sequence analysis
- Sequence similarity, sequence alignment
- Phylogeny reconstruction
- Quantitative trait modelling
- Microarray analysis
- Network biology

Teaching and working methods

The teaching consists of lectures and computer exercises. In addition, the student should engage in self-study. The language of instruction and examination is English.

Examination

The course is examined through:

- Individual written computer exam, grading scale: EC
- Group written report of computer labs, grading scale: EC, P/F.

To pass (E) as the final grade, at least E is required on the individual written computer exam and Pass on other components. Higher grades are based on the individual written computer exam.

Detailed information can be found in the study guide.

If special circumstances prevail, and if it is possible with consideration of the nature of the compulsory component, the examiner may decide to replace the compulsory component with another equivalent component.

If the LiU coordinator for students with disabilities has granted a student the right to an adapted examination for a written examination in an examination hall, the student has the right to it.

If the coordinator has recommended for the student an adapted examination or alternative form of examination, the examiner may grant this if the examiner assesses that it is possible, based on consideration of the course objectives.

An examiner may also decide that an adapted examination or alternative form of examination if the examiner assessed that special circumstances prevail, and the examiner assesses that it is possible while maintaining the objectives of the course.

Students failing an exam covering either the entire course or part of the course twice are entitled to have a new examiner appointed for the reexamination.

Students who have passed an examination may not retake it in order to improve their grades.

Grades

ECTS, EC

Other information

Planning and implementation of a course must take its starting point in the wording of the syllabus. The course evaluation included in each course must therefore take up the question how well the course agrees with the syllabus.

The course is conducted in such a way that there are equal opportunities with regard to sex, transgender identity or expression, ethnicity, religion or other belief, disability, sexual orientation and age.

If special circumstances prevail, the vice-chancellor may in a special decision specify the preconditions for temporary deviations from this course syllabus, and delegate the right to take such decisions.

About teaching and examination language

The teaching language is presented in the Overview tab for each course. The examination language relates to the teaching language as follows:

- If teaching language is “Swedish”, the course as a whole could be given in Swedish, or partly, or as a whole, in English. Examination language is Swedish, but parts of the examination can be in English.
- If teaching language is “English”, the course as a whole is taught in English. Examination language is English.
- If teaching language is “Swedish/English”, the course as a whole will be taught in English if students without prior knowledge of the Swedish language participate. Examination language is Swedish or English depending on teaching language.