Project Course: Bioinformatics of Big Data

Projektkurs: Bioinformatik av stordata
6.0 credits

Programme course

8BKG36

Valid from: 2022 Spring semester

Determined by	**Main field of study**	
Chairman of The Board for First and Second Cycle Programmes	Medical Biology	
Date determined	**Course level**	**Progressive specialisation**
2018-09-04	First cycle	G2X
Revised by	**Disciplinary domain**	
	Natural sciences	
Revision date	**Subject group**	
2021-05-03	Medical Biology	
Offered first time	**Offered for the last time**	
Autumn semester 2019		
Department	**Replaced by**	
Institutionen för biomedicinska och kliniska vetenskaper		

Course offered for

- Bachelor´s Programme in Experimental and Industrial Biomedicine

Entry requirements

General entry requirements for undergraduate studies
and
English corresponding to the level of English in Swedish upper secondary education (English 6)
And
Chemistry, Mathematics and Biology corresponding to the level in Swedish upper secondary education (Chemistry 2, Mathematic 4 and Biology 2)
Exemption from Swedish 3

Intended learning outcomes

Knowledge and understanding
On completion of the course, the student shall be able to:

- Describe the advantages and disadvantages of different programming platforms for solving specific biomedical problems.
- Describe how big data can be used to achieve precision medicine and the ethical issues that may arise ☐ Understand the limitations of using big data to solve biomedical problems
- Describe the computational challenges involved in the production, storage and analysis of large volumes of data
- Describe the life cycle of application development from a basic software engineering perspective
- Describe different ways of commercialising biomedical software solutions

Skills and abilities
On completion of the course, the student shall be able to:

- Use public omics databases and identify appropriate datasets in order to solve specific biomedical problems
- Write programs using the programming language R in order to read, process and analyse large biomedical datasets
- Identify and use suitable software packages and tools in order to solve specific biomedical problems
- Describe orally and in writing the potential of biomedical software solutions for economic and social development
- Apply and understand agile project management methods

Judgement ability and approach
On completion of the course, the student shall be able to:

- Demonstrate a critical approach to searching for relevant biomedical information within the field big data and bioinformatics
- Critically appraise the medical and financial potential biomedical software solutions have for society

Course content

The course encompasses the study of bioinformatic analysis of big data for the development of individualised medicine. The course encompasses training in the use of the programming language R to analyse large omics datasets, with the aim of identifying new biomarkers and drug targets. The course also introduces the processes through which biomedical software solutions can be developed, commercialised and published. In addition, the student will study concepts and ethical issues relating to the generation and use of big data in modern medical practice.
The course encompasses the fields bioinformatics, medical genomics, medical ethics and basic software development.

Teaching and working methods

At the Faculty of Medicine and Health Sciences student centred and problem based learning make up the foundation of the teaching. The student takes responsibility for, studies and researches current content of the courses and study programme. The methods of the course work challenge the students to independently formulate questions for learning, to seek knowledge and in dialogue with others judge and evaluate achieved knowledge. Students in the Bachelor's programme in Experimental and Industrial Biomedicine work together in groups based on reality based and course related biomedical issues to apply their knowledges, develop their own learning, contribute to the fellow students' learning and to practice cooperation. Throughout the study programme theory is integrated with practical modules. The course methods and integration modules stimulates and support the student's ability to apply their knowledge and professional competence.
Working methods used in this course are lectures, seminars and work in project groups.

Examination

The form of examination is a combined written project report and an oral presentation that is carried out as part of a group but assessed individually. In addition, active participation in compulsory course elements is required in order to pass the course. Compulsory course elements include project work, seminars, reports and written assignments.
The written project report and the oral presentation are resource-demanding forms of examination and are limited to five attemps.

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.

Application for examination

Instructions on how to apply for examinations are given prior to the beginning of each course.

Re-examination

The date for re-examination should normally be announced by the date of the regular examination at latest; in which case the scope must be the same as at the regular examination.

Examination for students with disabilities

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.

Nomination of another examiner

A student who has taken two examinations in a course or a part of a course without obtaining a pass grade is entitled to the nomination of another examiner, unless there are special reasons to the contrary.

Grades

Two-grade scale, U, G

Course literature

A literature reference list must be set no later than two months before the course begins by the programme committee for the Bachelor's Programme in Experimental and Industrial Biomedicine. There is no compulsory course literature.

Other information

Planning and implementation of the course is to be based on the wordings in the course syllabus. A course evaluation is compulsory for each course and should include how the course is in agreement with the course syllabus. The course coordinator will analyse the course evaluation and propose appropriate development of the course. The analysis and proposal will be returned to the students, the Director of Studies, and as needed to the Education Board, if related to general development and improvement.

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 the course is cancelled or undergoes major changes, examination is normally offered under this course syllabus, at a total of three occasions, within/in connection to the two following semesters, of which one in close proximity to the first examination.

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.