Project Course: Bioinformatics of Big Data

Programme course

6.0 credits

Projektkurs: Bioinformatik av stordata

8BKG36

Valid from: 2020 Autumn semester

Determined by
The Board for First and Second Cycle Programmes at the Faculty of Medicine and Health Sciences

Date determined
2018-09-04

Main field of study
Medical Biology

Course level
First cycle

Advancement level
G2X

Course offered for
- 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.
Point of time for retake examination must normally be announced no later than the time of the regular examination. The extent of the retake examination must be the same as the regular examination.

CHANGE OF EXAMINER

A student who has obtained a failing grade twice for a course or a part of a course is, after request, entitled to be appointed another examiner, unless there are special reasons to the contrary.

APPLICATION FOR EXAMINATION / WRITTEN EXAM

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

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 carried out in such a way that knowledge of gender, gender identity/expression, ethnicity, religion or other belief system, disability, sexual orientation and age is addressed, highlighted and communicated as part of the programme.
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.

Department

Medicinska fakulteten