Bioinformatics and Statistics

Programme course

6.0 credits

Bioinformatik och statistik

8BKG37

Valid from: 2019 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
G1X

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 theories and fundamental principles of statistical hypothesis testing
- Explain the principles of the use of parametric and non-parametric statistics in the analysis of biomedical data
- Describe the fundamental principles of statistical probability
- Assess challenges relating to statistical analysis of large volumes of data
- Describe bioinformatic tools used to answer biomedical questions
- Describe the theory and application of alignment methods for sequencing data

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

- Use appropriate statistical methods in analyses based on specific biomedical problems
- Interpret the results of common statistical tests from biomedical perspectives
- Calculate the probability of observing a set of independent, mutually exclusive or interdependent events
- Use public databases in order to obtain data of relevance to specific biomedical problems
- Write simple computer programs using the programming language R in order to carry out statistical analysis of biomedical data

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

- Apply a critical approach to the interpretation of results of statistical tests in biomedical research
- Apply a well-informed and critical approach in order to assess the advantages and disadvantages of applying various statistical methods to specific biomedical problems

Course content

During the course, the student will study basic biomedical statistics. The course focuses primarily on the statistical methods used in the analysis of small-scale biomedical data. Specific focus is placed on understanding the underlying principles of the most commonly used statistical methods. The student will apply this statistical knowledge to biomedical data by writing simple computer programs in order to analyse data obtained from published studies. The use and misuse of statistics within modern healthcare and biomedical research, and the ethical issues that arise when using them will also be studied. In addition, the student will be introduced to the field of bioinformatics and how to navigate and use online biomedical databases and bioinformatic tools to process large volumes of data.
The course encompasses the fields classical statistics, probability theory, bioinformatics and programming for statistical purposes.

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.
Work methods used in this course are lectures, tutorial groups, seminars and skills training through laboratory sessions.

Examination

The forms of examination are one individual written examination and one individual practical examination. In addition, active participation in compulsory course elements is required in order to pass the course. Compulsory course elements include tutorial groups, seminars and laboratory sessions.
Resource demanding examinations, in this syllabus the individual practical examination, are limited to five attempts. The written examination may be performed an unlimited number of times by those students who have not achieved a passing grade.
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

Four-grade scale, digits, U, 3, 4, 5

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