

Systems Biology

Programme course

6.0 credits

Systembiologi

8BKG45

Valid from: 2020 Spring semester

Determined by
Chairman of The Board for First and
Second Cycle Programmes

Date determined
2018-09-04

Revision date
2020-09-11

Main field of study

Medical Biology

Course level

First cycle

Advancement level

G2X

Course offered for

- Bachelor's Programme in Experimental and Industrial Biomedicine
- 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 principles of a system biology perspective within biomedical research and which medical problems the field is aiming to solve
- Describe biological and medical problems within systems biology
- Understand the respective limitations and possibilities of small-scale and large-scale systems biology approaches
- Understand systems biology concepts such as networks, hubs, modules, network motifs and sensitivity analysis.
- Describe methods used in systems biology.

Skills and abilities

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

- Apply adequate systems biology analysis methods to biomedical problems
- Apply and analyse results using modern systems biology methods
- Apply knowledge of gene and protein expression in order to explain why different biological signalling pathways can arise as an effect of variations in these

Judgement ability and approach

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

- Demonstrate a critical approach when it comes to searching for information and processing scientific articles within the field of systems biology.

Course content

During the course, the student will study basic systems biology and its application in biomedical research and medical problems. The course introduces basic concepts and mathematics underlying modern systems biology. This knowledge is applied in order to investigate the differences between small-scale and large-scale models using examples from biomedical research. It also introduces online analytical tools for systems biology and systems biology analyses with the help of the programming language R. These analyses are linked to case studies within systems medicine and systems pharmacology.

The course encompasses the field of system biology with links to pathology and pharmacology.

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, seminars and laboratory sessions.

Examination

The form of examination is an individual written examination and an individual practical examination. In addition, active participation in compulsory course elements is required in order to pass the course. Compulsory course elements include laboratory sessions, seminars, reports and written assignments.

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.

The examiner can decide to replace the compulsory element with an equivalent task if there are special reason to do so and if it is possible regarding the character of the compulsory element.

Application for examination / written exam

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

Retake of examination

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.

Examination of students with functional disabilities

If LiU's coordinator for students with functional disabilities has issued a student the right to customized examination at a written hall examination the student has the right to this. If the coordinator instead has given the student a recommendation of customized examination or alternative examination form, the examiner can decide on this if the examiner consider it possible based on the objectives of the course.

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.

Grades

The course is graded with the grades Fail (U) or passing grades 3-5, where 3 corresponds to approved, 4 corresponds to approved with credit and 5 corresponds to approved with distinction. The grade of the individual written examination (U, 3- 5) is the basis for the final grade of the course.

Grades

Four-grade scale, LiU, 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