Systems Biology

Systembiologi
6.0 credits

Programme course

8BKG45

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**	
	Medicine	
Revision date	**Subject group**	
2020-09-11; 2021-05-03	Medical Biology	
Offered first time	**Offered for the last time**	
Spring semester 2020		
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 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.

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.

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

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 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.