Developmental and Stem Cell Biology

Utvecklings- och stamcellsbiologi
6.0 credits

Programme course

8BKG22

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**
2017-08-22	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 2019		
Department	**Replaced by**	
Medicinska fakulteten		

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 regulation and function of the reproductive system.
- Explain normal reproduction, the different phases of embryonic development and organ formation as well as how dysfunction can lead to disease.
- Describe how developmental biological processes are connected during tissue formation.
- Explain how knowledge of developmental biology has been applied to stem cells in vitro.
- Describe the evolutionarily conserved principles underlying embryonic development.
- Describe transgenic techniques and explain their areas of use and applications.
- Explain medical applications of stem cells within disease research and regenerative medicine.

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

- Apply techniques based on the use of embryos and stem cells for disease research and regenerative medicine.
- Apply laboratory and research methods pertaining to the planning of experiments and the use of physiological, biochemical and molecular biological measurement methods.
- Independently gather, limit and critically process research literature within the field of developmental biology from a scientific, ethical and social perspective.

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

- Evaluate the validity of applications of stem cells for disease research and regenerative medicine.
- Evaluate the risks, advantages and disadvantages of the medical and experimental use of embryos versus stem cells in vitro.

Course content

The course involves the study of reproductive physiology and the different phases of embryonic development and organ formation, as well as how dysfunction of these processes can lead to disease. This includes normal regulation of the cell's life cycle and pathological consequences of genetic changes on cells and embryos. This course also covers stem cell biology, gene regulation, signal transduction, epigenetics and various applications of transgenic techniques within medical genetics and regenerative medicine. Knowledge of developmental and stem cell biology will be applied in order to understand monogenic and complex diseases and medical applications of stem cells and regenerative medicine within modern healthcare. Ethical issues pertaining to these activities will also be discussed.

This course covers histology, cell and molecular biology, embryology, organogenesis, epigenetics and stem cell biology, with links to physiology, pathology and regenerative medicine.

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.

The work methods in this course are tutorial groups, lectures, seminars and laboratory sessions.

Examination

The forms of examination are one individual written exam and one individual practical exam. In addition, active participation in compulsory elements is required in order to pass the course. Compulsory elements include laboratory sessions, tutorial groups, 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.

A student who has obtained a failing grade twice in a course or module, has the right to request for a new examiner except for extraordinary reasons.

Grades

The grades for the course are either fail (F) or grades 3-5, where 3 corresponds to pass, 4 corresponds to satisfactory and 5 corresponds to excellent. The grade for the individual written exam (F, 3-5) forms 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 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.