

Cell Metabolism, Signaling and Biochemistry

Cellens metabolism, signalering och biokemi

6.0 credits

Programme course

8BKG23

Valid from: 2022 Spring semester

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|---|----------------------------------|-----------------------------------|
| 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 mechanisms of action of hormones and other extracellular signalling molecules
- Describe different types of receptor-mediated signalling mechanisms and intracellular signalling pathways
- Describe the cellular metabolism of carbohydrates, lipids and proteins
- Explain principles of endogenous and exogenous molecular excretion
- Describe how the structure of an enzyme influences its activity and reaction rate
- Explain important enzyme kinetic parameters and reaction mechanisms of certain important enzymes in the body
- Exemplify how disturbed signalling function and metabolism can cause diseases and relate this to therapeutic strategies in respect to receptors and enzymes

Skills and abilities

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

- Calculate important enzyme kinetic parameters and interpret the significance for enzyme function
- Calculate important parameters in receptor characterisation and interpret the impact of agonists and antagonists
- Use basic biochemical analysis and separation techniques
- Interpret and present biochemical results in written reports

Judgement ability and approach

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

- Critically review and evaluate biomedical literature in the field of cell metabolism and signalling
- At a basic level, assess the most common medical consequences of a disturbed metabolism and cell signalling, and possible treatments directed towards enzymes and receptors

Course content

The course involves the study of the biochemical processes the body uses to maintain a functional metabolism, and intra and extra-cellular signal transduction. This encompasses study of nutrients, uptake and excretion processes as well as cellular metabolism of lipids, carbohydrates and proteins in order to understand how the body's requirements in terms of energy and essential metabolites are met. In addition, cell signalling processes between cells and organs, receptor activation and intracellular signal pathways are studied in order to gain a basic understanding of how the body's organs are regulated and function. The course also includes further studies of enzyme structure and functions, with specific focus on enzyme kinetics and mechanisms of action. The laboratory training involves the use of biochemical analysis and separation techniques, which are linked to the theoretical content of the course. During the course, knowledge of metabolism and cell signalling is linked to related diseases and therapeutic strategies.

The course covers cell biology and biochemistry, with links to endocrinology, physiology, 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.

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

Examination

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