



Faculty of Medicine

## LÄKC12, Molecule to Tissue, 25.5 credits

*Molekyl till vävnad, 25,5 högskolepoäng*

First Cycle / Grundnivå

---

### Details of approval

The syllabus was approved by The Medical Degree Programme Board on 2018-04-04 and was last revised on 2021-02-10. The revised syllabus applies from 2021-02-10, spring semester 2021.

### General Information

The course makes up the later part of semester 1 of the medical degree programme.

*Language of instruction:* Swedish

Literature and teaching in English may be included.

*Main field of studies*

Medicine

*Depth of study relative to the degree requirements*

G1N, First cycle, has only upper-secondary level entry requirements

### Learning outcomes

#### Knowledge and understanding

For a Pass on the course, the students shall be able to

- account for the general structure of proteins, carbohydrates, lipids and nucleic acids, and explain how their chemical properties and three-dimensional structure, and changes in these, contribute to their functions

- explain how the cell absorbs energy and building blocks from different nutrients, how the energy surplus is stored, and how catabolic and anabolic processes are integrated and regulated
- account for the structure of chromatin, how DNA is replicated and recombined in connection with cell division, and explain the mechanisms that contribute to the integrity of the genome
- account for the principles of information transfer from DNA via RNA to protein in the eukaryotic cell, including the formation of different RNA molecules, and explain how gene expression is regulated at different levels
- explain post-translational processes that result in proteins obtaining their final structure and being sorted for different destinations
- account for the formation of biological membranes, the impact of different membrane components on the functional properties of the membrane, and explain the role of membrane flow in the cell for its organisation and function
- account for the principles and mechanisms of transmembranous transport and its impact on the biological and electrophysiological properties of the cell
- explain and compare different mechanisms through which signals from the cell's exterior are received and communicated and lead to a cellular response, and provide examples of the regulation of the intensity and duration of the signals
- account for molecular mechanisms through which external and internal signals regulate transitions between the different phases of the cell cycle
- provide examples of defects and situations that cause cell death, and explain the underlying molecular and cellular mechanisms
- account for different mechanisms that can lead to the conversion of a cell into a cancer cell as well as further molecular changes that contribute to the ability of the cancer cell to cause metastases
- describe how protein filaments affect the form of the cell and explain how the structural and functional properties of the filaments contribute to both intracellular

processes and the migration of the cell, and its receptor-mediated interactions with its environment

- describe the composition of the extracellular matrix and explain how this supports the strength and elasticity of different tissues

- describe the different stages of meiosis, fertilisation and embryonic development during the first four weeks, and account for the establishment of the structure and tissues of the body at this time

- explain and discuss how properties and diseases are inherited according to Mendelian principles or through atypical and multifactorial inheritance

- account for the response of the innate immune defence to infection and injury, and explain how the reaction leads to inflammation

- account for the genetic mechanisms that enable the lymphocytes to react to a diversity of infections, and explain why this leads to the forced selection of lymphocytes

- explain how and where the cells of the acquired immune defence discover and respond to infection, how they cooperate amongst themselves and with the cells of the innate immune defence, how the cooperation leads to an adapted defence and immunological memory, and how this is related to the function of vaccines

- account for how the approach and feedback of participants can affect cooperation in groups

- state key laws and ordinances of significance to the physician's interaction with patients

### **Competence and skills**

For a Pass on the course, the students shall be able to

- perform biomedical experiments based on written instructions, compile and present the results in a written report, and identify the sources of error of the methods used
- use and interpret pedigrees and make risk calculations for monogenic diseases
- with respect for others and awareness of their own role in a group participate actively in joint problem-solving
- provide constructive feedback to fellow students and lecturers about problem-based learning and the work in groups
- identify the issue and the scientific and statistical methods in a research article related to the contents of the course
- account for a research article on the core subject of the course through a written summary in Swedish intended for fellow students.

### **Judgement and approach**

For a Pass on the course, the students shall be able to

- reflect on the vulnerability of patients in care situations based on their own experiences
- reflect on the challenges and possibilities of the profession of physician and on their future professional role as such and in relation to other healthcare professions
- adopt a respectful approach to patients, the patients' loved ones, fellow students, and healthcare and university staff
- reflect on their need for knowledge in relation to predetermined goals and on their strong and weak points as students, and use these reflections to formulate appropriate study strategies

### **Course content**

The course serves as a basis for a biomedical understanding of the normal state of the body and prepares the students for an understanding later in the programme of the emergence, diagnosis and treatment of different clinical diseases. The eukaryotic cell's building blocks, organisation and life-supporting functions, such as metabolism, cell division and communication, are studied from perspectives of both molecular biochemistry and cell biology. These perspectives are also used to exemplify the specialised functions of cells in tissues and in the immune defence of the body. The course includes basic genetics, oncogenesis and embryology. As a part of achieving the learning outcomes of the course, the students develop their abilities from the previous course with regard to reading and discussing scientific literature and conducting and reporting laboratory work. The course also includes a basic theoretical and practical preparation for healthcare and medical care, and cooperation with other professions. The students are introduced to the shared core expertise of the caring professions (person-centric care, cooperation in teams, evidence-based care, profound knowledge of improvement, safe care, informatics) and of the legislation of significance to the physician's interaction with the patient.

The students participate in clinically integrated learning at a retirement home including a follow-up seminar. Knowledge and skills with regard to study technique, communication and leadership, which are required for long-term learning and cooperation in groups throughout the programme and in working life, will be obtained through, for example, active student work in learning groups.

## Course design

The fundamental principle of the course is student-centred learning, in which the students take responsibility for their own knowledge development. To support the students' learning, the key knowledge content of the course is addressed through problem-based learning (PBL). The PBL components are to enable students to develop a scientific and professional approach. Other learning components such as lectures, group exercises, seminars, activities via a learning platform and laboratory/practical exercises complement the PBL components. Furthermore, the course includes components of clinically integrated learning at institutions in the whole healthcare region of Southern Sweden.

The PBL components, clinically integrated learning, group exercises concerned with professional development and other group activities specified in the course portfolio are compulsory. Subject to a special decision by the examiner, compulsory components may be replaced by a written make-up assignment. The examiner determines whether a student has achieved the outcomes for the compulsory components documented in the course portfolio.

## Assessment

Continuous and active participation in the compulsory PBL activities is a key element of the assessment of the course. The PBL activities are used to assess a basic professional approach and the ability to work constructively in groups. The PBL activities are divided into two separate assessed components of 3 credits each: "PBL- Basic Professional Approach" and "PBL- Self-Understanding and Constructive Work in Groups".

"PBL- Basic Professional Approach" is used to assess the outcomes in the course syllabus covering these abilities and approaches. The examiner may with immediate effect interrupt a student's PBL activities if the student shows such serious deficiencies in the basic professional approach as to seriously counteract the group's PBL activities, or if the student does not demonstrate the basic professional approach that surrounds PBL activities. Such a measure must be preceded by a warning from the examiner to the student. When PBL activities are interrupted in this way the student will be awarded a grade of Fail for the component and have used up one opportunity for PBL

activities. If a student is awarded a grade of Fail for this component an individual study plan is to be drawn up. If the student is awarded a grade of Fail for the component "PBL- Basic Professional Approach", he or she may not participate in the examinations of the course.

The component "PBL- Self-Understanding and Constructive Work in Groups" is used to assess the outcomes in the course syllabus covering these abilities and approaches.

The knowledge content of the course is assessed through a written exam (15 credits). The exam is in the form of a multiple choice test, requiring the student to select the best answer. A failed test is to be retaken in full with the same exam design.

The students are continuously to document completed compulsory components, written assignments, passed practical components and passed clinically integrated learning in a course portfolio worth 4.5 credits. The course portfolio is also used to document judgement and scientific and professional approach. The documentation is to include both oral and written components.

The examiner decides on grading.

The first opportunity for a student to participate in an examination is at the first regular opportunity after registration on the course.

### **Number of assessments of Problem-Based Learning (PBL):**

Students who do not achieve a Pass at the first training opportunity will have two more opportunities for assessment. The number of opportunities for assessment of PBL is limited to three. A student who has failed PBL three times will have to discontinue their studies on the programme.

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

*Subcourses that are part of this course can be found in an appendix at the end of this document.*

### **Grades**

Marking scale: Fail, Pass.

## Entry requirements

General and courses corresponding to the following Swedish Upper Secondary School Programs: Biology 2, Physics 2, Chemistry 2 and Mathematics 4.

## Subcourses in LÄKC12, Molecule to Tissue

Applies from H18

- 1801 Written Examination, 15,0 hp  
Grading scale: Fail, Pass
- 1802 PBL – Basic Professional Approach, 3,0 hp  
Grading scale: Fail, Pass
- 1803 PBL – Self-Knowledge and Constructive Group Work, 3,0 hp  
Grading scale: Fail, Pass
- 1804 Portfolio, 4,5 hp  
Grading scale: Fail, Pass