Course syllabus for

Homeostasis and the Environment of the Cell, 8 credits

Cellens homeostas och dess omgivning, 8 hp
This course syllabus is valid from autumn 2024.

Course code	1BL002
Course name	Homeostasis and the Environment of the Cell
Credits	8 credits
Form of Education	Higher Education, study regulation 2007
Main field of study	Not applicable
Level	G1 - First cycle 1
Grading scale	Pass, Fail
Department	Department of Laboratory Medicine
Decided by	Education committee LABMED
Decision date	2024-03-21
Course syllabus valid from	Autumn 2024

Specific entry requirements

Biology 2, Physics 1a or Physics 1b1+1b2, Chemistry 2, Mathematics 3b or Mathematics 3c or Mathematics C.

Objectives

The general aim of the course is that the student should acquire basic knowledge about how the cell maintains their homeostasis. This means that the student acquires knowledge of the structure and function of the eukaryotic cell from events such as mitosis to metabolism and interaction with the environment.

The course also contains basic practical work and analysis in biomedical laboratory science.

Knowledge and understanding
On completion of the course, the student should be able to:

- **Explain** the structure and function of biomolecules and cell membranes including transport mechanisms and the regulation of enzymes. (SOLO 4)
- **Explain** key steps in the metabolic processes of the body and on a general level explain how these processes interact to maintain the metabolism and support the energy requirements of the body. (SOLO 4)

- **Explain**key steps in metabolic processes and their relationship with the metabolism of the body. (SOLO 3)
- **Explain** the structural organisation of eukaryotic cells and how cells use signalling and interactions with other cells and extracellular matrix to maintain both internal and external homeostasis. (SOLO 4)
- **Compare** the general structure between eukaryotic and prokaryotic cells and viruses. (SOLO 4)
- **Explain** the structure of the nucleic acids based on its chemical properties and how gene expressions take place and is regulated. (SOLO 4)
- **Explain** the life cycle of the cell including DNA replication, cell division and cell death and explain how genetic mutations can affect cell function and homeostasis. (SOLO 4)

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

- **Know how** to plan, perform and document practical laboratory work and how to interpret analyses based on reasonableness and with application of descriptive statistics. (Miller 2)

Judgement and approach
On successful completion of the course, the student should be able to:

- **Reflect** on their need for additional knowledge and lifelong learning. (SOLO 3)
- **Reflect** on how to assess and use relevant information to discuss facts, phenomena and issues. (SOLO 3)

Content

The course deals with three competence areas; basic scientific competence (theory in biochemistry and cell and molecular biology) biomedical laboratory scientific competence (practical parts) and scientific competence (practical parts).

Biochemistry, 3.0 hp

Grading scale: GU

This course component examines the relationship between structure and function of biomolecules in the cell with special focus on the structure and properties of proteins, lipids and carbohydrates.

The course component includes the following fields:

- Structure and function of biomolecules: proteins, lipids and carbohydrates
- The role of the proteins as carriers and enzymes
- Basic metabolism of carbohydrates, lipids and amino acids
- General regulation of metabolic paths
- The energy metabolism of the cell
- The importance of the biochemistry in biomedical laboratory science
- Laboratory miniproject with a focus on planning and implementation

Cell- and molecular biology, 5.0 hp

Grading scale: GU

This course component gives a thorough introduction to the structure and function of eukaryotic cells.

The course component includes the following fields:

- The structure and function of eukaryotic organelles of the cell
- The structure and organisation of the nucleic acids

- Gene expression; transcription and translation
- Protein transport, modification and sorting
- Vesicle transport
- Cell signalling and signal paths
- The mechanisms of the cell cycle: DNA replication, cell division and cell death
- Basic genetics: genetic diseases and the effect of mutations
- Comparisons between eukaryotic cells, prokaryotic cells and viruses
- Laboratory miniproject with a focus on data analysis and documentation

Teaching methods

The pedagogy is based on student-centred and student activated learning. This includes, for example, lectures, digital lectures with follow-up seminars (flipped classroom), seminars, quizzes, group assignment and miniproject.

Examination

Biochemistry
Examination: Written digital examination.
Compulsory: Laboratory sessions/miniproject.
Formative assessments

Cell and Molecular Biology
Examination: Written digital examination
Compulsory: Documentation of laboratory session/miniprojects.
Formative assessments

The examiner decides if, and how, absence from compulsory parts can be compensated. Study results cannot be reported until the student has participated in compulsory course elements or compensated for any absence in accordance with instructions from the examiner. Absence from a compulsory educational component may mean that the student cannot participate in the compulsory part until the next time the course is given.

Students who do not pass a regular examination are entitled to participate in the examination on five more occasions. If the student has failed six examinations/tests, no additional examination is given. Each occasion the student participates in the same test counts as an examination. Submission of a blank exam paper is regarded as an examination. In case a student is registered for an examination but does not attend, this is not regarded as an examination.

In case of special reasons, or need for adaptation for a student with a disability, the examiner may decide to depart from the syllabus's regulations on examination form, number of examination opportunities, possibility of completion or exemption from compulsory educational elements, etc. Content and intended learning outcomes as well as the level of expected skills, knowledge and abilities must not be altered, removed or lowered.

Transitional provisions

For a course that has ceased or undergone major changes or where the reading list has been changed considerably should be given additional test (excluding regular test) on the earlier contents or the previous literature during a time of a year from the date the change took place.

Other directives

Course evaluation will be carried out according to the guidelines that are established by the Committee for Higher Education.

Teaching in English occur.

Literature and other teaching aids

Chandar, Nalini; Viselli, Susan

Cell and molecular biology

Third edition. : Philadelphia : Lippincott Williams & Wilkins, [2023] - 270 pages

ISBN:9781975180959 LIBRIS-ID:zfpdnjjww256c5jg

Library search

Alberts, Bruce

Molecular biology of the cell

Seventh edition, International student edition : New York : W.W. Norton and Company, [2022] - 1552 sidor med varierande paginering

ISBN:9780393884852 LIBRIS-ID:q58h190nnwjcfgcp

Library search

Fundamentals of general, organic, and biological chemistry

McMurry, John; Ballantine, David S.; Hoeger, Carl A.; Peterson, Virginia E.; Madsen, Sara; Meert, Christel; Pearson, Andrew

eighth edition : Pearson, 2017 - 971 sidor

ISBN:9780134015187 LIBRIS-ID:jszqwtjhgdhb6np1

Library search