

BIMA46, Biomedicine: Molecular Cell Biology, 10 credits

Biomedicin: Molekylär cellbiologi, 10 högskolepoäng

First Cycle / Grundnivå

Details of approval

The syllabus was approved by Committee for Biomedical, Medical and Public Health Education on 2016-02-10 to be valid from 2016-06-01, autumn semester 2016.

General Information

The course is a compulsory component of the Bachelor of Medical Science programme in Biomedicine and is included in semester 3.

Language of instruction: Swedish and English

The reading list includes titles in English.

Main field of studies

Biomedicine

Depth of study relative to the degree requirements

G1F, First cycle, has less than 60 credits in first-cycle course/s as entry requirements

Learning outcomes

Knowledge and understanding

On completion of the course, the students shall be able to use terminology from the research literature to

- explain and compare different principles of how extracellular signals reach into the cell, are amplified, transmitted and terminated, and give examples of how signal paths are integrated and how specificity is achieved
- account for the regulation of gene expressions at different levels, and exemplify and explain methods for how gene expressions can be manipulated and studied experimentally
- explain principles of how tissue-specific gene expressions are obtained, and exemplify how this gives rise to specialised cells

- explain molecular mechanisms behind the process of the cell cycle and cell division in the cell, and how it is regulated as a response to internal and external signals
- describe and compare different molecular mechanisms of the emergence and repair of DNA damages
- describe and compare different molecular mechanisms of cell death and explain how this is connected to DNA damage
- explain how molecular defects in a cell can lead to its conversion into a cancer cell
- describe the molecular structure and dynamics of an extracellular matrix and explain how it is connected to the function
- explain how cells interact with an extracellular matrix and with each other, and exemplify how these interactions are regulated
- explain different principles and molecular mechanisms of how and why cells move, and give examples of a biological situation where this is important
- describe the requirements for GLP adaptation and the clinical certification of a method.

Competence and skills

On completion of the course, the students shall be able to

- identify and present relevant information from research publications on issues of cell and molecular biology and relate the information to the context of cell biology
- apply knowledge of cell biology by interpreting and critically assessing results from research publications
- plan and execute simple experiments in order to solve a problem of cell biology, including the interpretation, adaptation and application of method descriptions and statistics, and summarising the laboratory results in writing in a form similar to a research article
- work in groups and make a constructive assessment of their role in the group

Judgement and approach

On completion of the course, the students shall be able to

- reflect on the reasons why the public sector requires quality assurance of the development and production of drugs and analyses of patient materials
- provide and receive constructive feedback and reflect on how this affects the quality of research articles and presentations
- judge their level of knowledge of cell biology and take responsibility for their knowledge development based on this assessment

Course content

The course provides students with specialisation but also a broadening of the knowledge obtained on courses in biochemistry and basic cell biology in year 1. Different subjects within cell biology are addressed on a weekly basis, including intracellular signal transmission, gene regulation and non-coding RNA, cell cycle and cancer, cell interactions, extracellular matrix, and the movement of cells. The course focuses on molecular and cellular mechanisms controlling the basic functions of cells and their environment. Furthermore, the course serves as a bridge to future courses in immunology, physiology and pathobiology among other subjects, by giving examples of specialised cells and their role in different physiological and pathophysiological

situations. In addition to knowledge in cell biology, the course provides students with skills in extracting, interpreting and presenting information from research articles, and in experimentally solving problems within cell biology by adapting and applying methods of cell and molecular biology. The course also provides students with training in group work and in providing and receiving feedback.

Course design

The learning outcomes of the course are primarily to be attained through compulsory group exercises and problem-based learning (PBL) consisting of thematic weeks. The students are to work in groups that meet twice a week. At the first meeting, students analyse a problem within cell biology, checking the current knowledge of the group members and formulating the study goals for the week. At the final meeting, the group examines and discusses the knowledge acquired individually and reconnects to the case. The group work is supported by a tutor. The PBL sessions provide the students with training in taking responsibility for their knowledge development and working constructively in groups.

As a complement to the PBL sessions, the course includes lectures intended to support/summarise and/or specialise the learning process. Some of the learning outcomes are also addressed through a laboratory exercise.

The practical components of the course enable the students to plan and execute experiments in order to solve a problem in cell biology. At the planning stage, the students are to specialise in and adapt the methods to be applied later. In the laboratory component the students practise describing research results in writing in a form used for scholarly publications, including the use of statistics.

The students are to attain the skills outcomes concerning scientific literature through a number of article presentations. On these occasions, the students read, present and interpret research articles and results linked to the subjects within cell biology covered in the course.

Students practise providing and receiving constructive feedback through peer review of the PBL work, article presentations and laboratory reports.

Active participation in group work and laboratory exercises is compulsory.

Assessment

The assessment is based on three examination components: a written exam, biostatistics portfolio and course portfolio.

The learning outcomes concerning knowledge and understanding are mainly assessed on the basis of the written exam. The learning outcomes concerning competence and skills and judgement and approach are assessed on the basis of the written exam, a passed biostatistics portfolio and a passed course portfolio. The course portfolio is to

include active participation in the article presentations, PBL and laboratory exercises, and the submission of a laboratory report, among other things. The biostatistics portfolio is to include the choice of a statistical method and submission of a laboratory report, among other things.

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

To be admitted to the course, students must have 15 credits of chemistry, 10 credits of cell chemistry/biochemistry and 15 credits of cell biology

Further information

The course largely corresponds to the previous course BIMA71.

Subcourses in BIMA46, Biomedicine: Molecular Cell Biology

Applies from H16

- 1601 Written exam, 5,0 hp
Grading scale: Fail, Pass
- 1602 Course portfolio, 4,5 hp
Grading scale: Fail, Pass
- 1603 Biostatistical portfolio, 0,5 hp
Grading scale: Fail, Pass