



Faculty of Medicine

BIMB10, Biomedicine: Biology and Chemistry of the Cell, 30 credits

Biomedicin: Cellens biologi och kemi, 30 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Master's Programmes Board on 2020-03-31 to be valid from 2020-04-01, autumn semester 2020.

General Information

The course is compulsory in the Biomedicine programme and is included in semester 1.

Language of instruction: English

Main field of studies

Biomedicine

Depth of study relative to the degree requirements

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

Learning outcomes

Knowledge and understanding

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

- give an account of the organisation of the periodic system, atomic structure, valence electrons, radii, electronegativity and orbital theory with a focus on biochemically important elements
- give an account of the nomenclature, stereochemistry, acid-base properties and basic reaction mechanisms of organic compounds.
- explain relationships between the structure of organic compounds, chemical reactivity and biological activity
- give an account of the synthesis and structure of proteins and nucleic acids and explain what three-dimensional molecular structure means for proteins' function and interaction with other biomolecules

- explain chemical equilibrium, thermodynamic concepts and the role of enzymes in chemical reactions in the cell
- give an account of the general morphology of eukaryotic and prokaryotic cells and the mechanisms for transport of ions and molecules over their cell membranes and cell walls respectively
- give an account of how proteins are sorted and transported to different destinations in, on and outside the cell and explain the chemical and biological properties that facilitate this
- describe the structural organisation of genes and explain the transcription and translation concepts in eukaryotic and prokaryotic cells
- give an account of the different phases of the cell cycle and explain the principles behind DNA replication and cell division.
- give an account of basic methodology used in purifying, analysis and visualisation of DNA and proteins, and explain the chemical properties and reactions that facilitate this
- give an account of different types and distributions of data, random samples, central measures, dispersion measures and the basic principles of hypothesis testing
- give an account of research ethics principles and academic integrity.

Competence and skills

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

- draw and in some other way visualise chemical structures
- carry out stoichiometric calculations based on equilibrium constants.
- carry out basic laboratory techniques in practice, such as pipetting, weighing and measurement, and reflect on whether analysis results are reasonable
- apply principles for research literature searches and handle reference management systems
- plan, carry out, document and summarise laboratory work, in writing, in a scientific way
- process and present their own data statistically and evaluate how data has been presented in research publications
- provide constructive feedback on other people's experiment design and written summaries in order to improve and clarify these
- evaluate risks relating to experimental frameworks in laboratory sessions.

Judgement and approach

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

- reflect on their need for biomedical knowledge and societal utilisation in a future professional role
- reflect on research issues in cell biology and chemistry
- reflect on learning, individually and in groups, and on their own contribution to constructive feedback in order to improve the work of the group.

Course content

The course introduces general, analytical and organic chemistry with links to cell biology, and the bioactivity, structure and solubility of organic molecules.

The building blocks, structures and organelles of the cell are studied and form the basis for discussions about the chemical processes that take place in the cell and contribute to its function. Chemical nomenclature is studied and applied with a focus on the biomedical subject area. The importance of functional groups in biomolecules

is discussed and related to what drives chemical reactions in and outside the cell. Acid-base theory is discussed and concepts such as pH and the pKa are related to the biology of the cell. Chemical bonds in and outside the cell are compared and bond strength is related to reactivity and stability. A large part of the course is devoted to the genetic information carriers of the cell and how this information can be transferred in cell division and protein synthesis.

The course also includes scientific approach, academic integrity, searching for, and handling, research references and the application of basic biostatistics and evaluation of how data is presented in research journals. Group communication and active learning are included as an important part of the course to prepare for future sustainable learning. Study visits to a research laboratory at the University or in the private sector are carried out to illustrate the future professional role of a biomedical student and to constitute a basis for reflection.

Course design

Teaching of cell biology is integrated with general and organic chemistry from a biologically and biomedically relevant perspective. Different forms of active learning for students are applied in the course. Lectures, individual assignments and preparatory materials (texts, video etc) provide support for the students to gradually achieve the learning outcomes.

Proficiencies and abilities are trained by planning, carrying out and reporting a project during the course. A number of laboratory sessions are carried out which apply basic laboratory proficiencies and advanced techniques linked to the course content. Proficiencies such as summarising methods and results, and giving and taking feedback are applied throughout the course. During group exercises, students are trained in the use and application of computations, literature searches and evaluation of research publications.

All learning components that are associated with laboratory sessions and preparation for these are compulsory, as are application exercises in groups.

Assessment

The learning outcomes are continuously assessed by multiple-choice questions during the course and in a research and biostatistics portfolio. The basics of biostatistics are assessed partly through multiple-choice questions and partly through processing and evaluation of their own and other's data. A written examination towards the end of the course assesses integrated knowledge of the biology and chemistry of the cell.

Other forms of examination may be used if there are special reasons.

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, Chemistry 2, Mathematics 4.

Subcourses in BIMB10, Biomedicine: Biology and Chemistry of the Cell

Applies from H20

- 2001 Scientific portfolio, 10,0 hp
Grading scale: Fail, Pass
- 2002 Biostatistical portfolio, 2,5 hp
Grading scale: Fail, Pass
- 2003 Multiple-choice questions, 7,5 hp
Grading scale: Fail, Pass
- 2004 Written exam, 10,0 hp
Grading scale: Fail, Pass