

BIMA16, Biomedicine: Introduction to Organic Chemistry, 7.5 credits

Biomedicin: Introduktion till organisk kemi, 7,5 högskolepoäng
First Cycle / Grundnivå

Details of approval

The syllabus was approved by The Master's Programmes Board on 2018-01-23 to be valid from 2018-01-24, autumn semester 2018.

General Information

The course is a compulsory component of the Bachelor's programme in Biomedicine, semester 1.

Language of instruction: Swedish

The literature used on the course is in 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

- define K_a , pK_a , and pH as well as use pK_a values to predict reaction equilibria
- account for stereochemical concepts, conformation and configuration as well as explain what influence stereochemistry has on various organic molecules' properties
- explain concepts such as isomers, stereoisomers, diastereomers and enantiomers, as well as apply stereochemical nomenclature to name molecules
- explain and compare how functional groups in organic molecules contribute to reactivity and structural changes at different pH values

- account for different types of chemical bond and compare their effect at the inter- and intramolecular levels
- account for basic orbital theory and the concepts of aromaticity and resonance
- explain the concepts of inductive effects, resonance effects and steric effects as well as their effect on molecule properties and reactivity
- explain and compare different types of chemical reaction
- compare chemical reactions in the laboratory and in biological systems
- explain how hydrophobic and hydrophilic properties affect molecules' solubility at the cellular and organism levels
- name organic molecules and draw chemical structures based on chemical nomenclature

Competence and skills

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

- document laboratory work in a correct, scientific manner
- draw and visualise chemical structures by using software provided in advance
- plan scientific trials to study properties such as pH, pKa and stereochemistry, and describe these in a research plan, implement trials and write a summary of methods and results
- provide constructive feedback on other research plans and written summaries with an aim to improve and/or clarify them

Judgement and approach

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

- reflect on issues in organic chemistry as well as **evaluate** risks associated with the structuring of experiments in laboratory sessions

Course content

The course provides basic and biomedically relevant knowledge about organic molecules' structure and function, and how these are affected by surrounding factors. Understanding of chemical processes is trained through argumentation concerning the driving forces behind intra- and extracellular chemical reactions. Nomenclature is practised and applied with a considerable focus on the subject area of biomedicine. Knowledge of organic molecules such as carbohydrates, amino acids, nucleic acids, saturated and unsaturated fatty acids, transmitter substances and steroids is applied with parallel teaching of cell biology. The importance of functional groups in these biomolecules is set in the context of cell biology. Theories of acids and bases are discussed and compared. The concepts of PH and pKa are related to human cell biology. Argumentation relating to the bioactivity, structure and solubility of organic molecules is conducted in parallel with the teaching of cell biology. The concepts of different chemical bonds, both intra- and extracellular, are compared, and bond strength is placed in relation to reactivity and stability.

The following aspects are practised and applied throughout the course: generic knowledge regarding the planning, documentation and implementation of scientific trials, summarising methods and results, and giving and taking feedback.

Course design

The course is based on group work and active learning in accordance with team-based learning (TBL), using structured weekly themes. Two laboratory sessions are linked to the course. These are planned and implemented as applications by the students. Planning consists of brief, written research programmes in which methods are described and justified. Feedback on research programmes from both students and supervisors contributes to learning to work with feedback. Risk analyses are an important component, as is documentation of completed laboratory sessions.

Assessment

The assessment of learning outcomes according to special assessment criteria is applied in the following: weekly individual multiple-choice questions, written academic work in the form of research programmes, risk analyses and summaries of methods and results. A considerable part of the assessment is conducted during the course.

Other forms of assessment can be used, if there are special reasons.

Subjects examined

Individual readiness assurance test (IRAT), 2.5 credits
Portfolio, 5 credits

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 BIMA16, Biomedicine: Introduction to Organic Chemistry

Applies from H18

1801 Individual Readiness Assurance Test (iRAT), 2,5 hp

Grading scale: Fail, Pass

1802 Portfolio, 5,0 hp

Grading scale: Fail, Pass