



Faculty of Health, Science and Technology  
Chemistry

# Syllabus

## Biochemistry

**Course Code:**

KEGA11

**Course Title:**

Biochemistry  
*Biokemi*

**Credits:**

7.5

**Degree Level:**

Undergraduate level

**Progressive Specialisation:**

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

**Major Field of Study:**

KEA (Chemistry)

### Course Approval

The syllabus was approved by the Faculty of Health, Science and Technology 2021-08-27, and is valid from the Spring semester 2022 at Karlstad University.

### Prerequisites

Registered for Introductory Chemistry, 7.5 ECTS credits, or Matter, 7.5 ECTS credits, and Chemical Calculations, 7.5 ECTS credits, or equivalent

### Learning Outcomes

Upon completion of the course, students should be able to:

1. describe the structure of different cell types
2. explain the function of the macro molecules in the cell based on their structure and chemical properties
3. describe the flow of genetic information, from DNA to protein
4. describe some common biochemical methods for analysing and separating proteins and for use in the field of gene technology, and give examples of applications
5. describe some metabolic reactions of the cell
6. explain the principles of oxidative phosphorylation and photophosphorylation

7. perform simple experiments on protein separation and use some basic methods of DNA technology
8. document and report the performance of experimental work with a scientific approach, orally and in writing.

## **Content**

Learning outcome 1: Animal and plant cells and prokaryote cells

Learning outcome 2: Proteins, carbohydrates, lipids and nucleic acids. The function of proteins as catalysts, receptors and transporters. Inhibition of enzymatic catalysing reactions. The function of carbohydrates and lipids in energy conversion. The functions of lipids and proteins in membranes. The function of DNA as conveyor of the genetic information. The function of RNA in expressing the genetic information.

Learning outcome 3: Replication, transcription, and translation.

Learning outcome 4: Chromatographic methods such as gel filtration, ionic and affinity chromatographic exchange. Electrophoretic methods such as native and denaturing polyacrylamide gel electrophoresis, isoelectric focusing, two-dimensional electrophoresis, and agarose gel electrophoresis. Methods of DNA technology such as PCR, DNA cleavage with restriction enzymes, gene cloning, DNA sequencing.

Learning outcomes 5 & 6: Glycolysis, citric acid cycle, the mitochondrial electron transport chain and the light and dark reactions of the photosynthesis. The chemiosmotic principle.

Learning outcome 7: Laboratory experiments according to instructions.

Learning outcome 8: Protocol and reports based on laboratory experiments.

## **Reading List**

See separate document.

## **Examination**

Assessment of the theoretical part is based on hand-in assignments and an individual written exam. Assessment of the laboratory part is based on mandatory attendance and active participation in laboratory work, a safety test, and lab reports according to instruction within given time limits.

If students have a decision from Karlstad University entitling them to Targeted Study Support due to a documented disability, the examiner has the right to give such students an adapted examination or to examine them in a different manner.

## **Grades**

One of the grades Distinction (VG), Pass (G), or Fail (U) is awarded in the examination of the course. For Engineering students, one of the grades 5 (Pass with Distinction), 4 (Pass with Some Distinction), 3 (Pass), or U (Fail) is awarded in the examination of the course.

## **Quality Assurance**

Follow-up relating to learning conditions and goal-fulfilment takes place both during and upon completion of the course in order to ensure continuous improvement. Course evaluation is partly based on student views and experiences obtained in accordance with current regulations and partly on other data and documentation. Students will be informed of the result of the evaluation and of any measures to be taken.

## **Course Certificate**

A course certificate will be provided upon request.

## **Additional information**

The local regulations for studies at the Bachelor and Master levels at Karlstad University

stipulate the obligations and rights of students and staff.

The course may include as many as 5 days of mandatory attendance at Karlstad University.