

Biochemistry: Metabolism (0000156)

Course size *(nominal values; actual values may depend on programme)*

Credits 4.0 **Study time** 120 h **Contact hrs** 45.0h

Course offerings and teaching methods in academic year 2022-2023

A (semester 1)	English	Incheon	practicum	22.5h
			lecture	22.5h

Lecturers in academic year 2022-2023

Magez, Stefan	KR01	lecturer-in-charge
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Offered in the following programmes in 2022-2023

	crdts	offering
Bachelor of Science in Environmental Technology	4	A
Bachelor of Science in Food Technology	4	A
Bachelor of Science in Molecular Biotechnology	4	A
Joint Section Bachelor of Science in Environmental Technology, Food Technology and Molecular Biotechnology	4	A

Teaching languages

English

Keywords

Biochemistry, Metabolism, Enzyme, Protein, Lipid, Carbohydrate, Antibody, Protein Analysis

Position of the course

The basic concepts of the metabolic processes in the cell are studied. The most important biochemical cycles and enzymatic processes are described, as well as the regulation of the different pathways. This course is meant to provide the student with a sufficient insight in bio-energetics and intermediary metabolism.

Contents

- 1 Introduction to metabolism (refresh of Introduction to Biochemistry)
- 2 Practical aspects of protein purification, protein identification and protein structure determination
- 3 Basic principles of protein sequence analysis
- 4 Glycolysis, gluconeogenesis and glycogen metabolism
- 5 Regulation of carbohydrate metabolism in function of cellular energy level
- 6 Citric acid cycle, and regulation in function of cellular energy level
- 7 Oxidative phosphorylation and the generation of ATP
- 8 The Calvin cycle, the Pentose phosphate pathway and photosynthesis
- 9 The link between the carbohydrate metabolism, the protein metabolism and the fatty acid metabolism
- 10 Basics of amino acid and nucleotide metabolism.
- 11 Biochemistry of signal transduction: vision, smell, taste and hormone signals

Initial competences

General biology and basic biochemistry concepts (including the structure of building blocks that represent the molecules of life) are considered initial competences for this course. Competences acquired in Introduction to Biochemistry: Biomolecules and Organic Chemistry 1 are crucial as well.

Final competences

- 1 Understand the basic principles in metabolism and the links between different metabolic pathways. The student can use the gained knowledge to solve

- problems related to the course contents.
- 2 Be aware of the importance of biochemistry in understanding the basic biological problems that govern health and disease.
 - 3 Understand how structures of biological molecules are important for their function.
 - 4 Have knowledge of the basic formulas to calculate energy values for basic biochemical reactions, as well as the pH for biochemical relevant environments.
 - 5 Be able to discuss the critical biochemical components of various food components and place this in the context of beneficial or detrimental dietary effects.
 - 6 Understand the basics of the technologies used for protein purification and protein identification.
 - 7 Be able to assess scientific concepts in the field of biochemistry.
 - 8 Be aware of basic biochemical assays used to study metabolisms of various organisms.
 - 9 Adopt a positive attitude towards independent and life-long learning.
 - 10 Have social and communicative competencies in an international multicultural context.
 - 11 Be able to communicate via an English oral discussion.
 - 12 Be aware of public debates in the context of biochemical compositions of processed foods.
 - 13 Be aware of the complementarity of biochemistry, genetics and other biological sciences in the study of human evolution and biological evolution in general.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Practicum, Lecture

Learning materials and price

Learning material is provided as PowerPoint presentation and movies explaining basic principles that are both available on Ufora. An education Biochemistry textbook is strictly followed with respect to content. It is being advised to purchase the reference book, as it is a work that covers the basic principles that supporting various other courses throughout the curriculum. However, the book is also available at the GUGC library.

All lectures are also available as video recorded material.

References

Berg, Tymoczko, Gatto, Stryer. Biochemistry (7th or 8th Edition) W.H. Freeman and Company - New York.

Course content-related study coaching

Practical courses are designed to directly support the biochemical principles outlined in the course (participation in the latter is obligatory).

Assessment moments

end-of-term assessment

Examination methods in case of periodic assessment during the first examination period

Written examination with open questions

Examination methods in case of periodic assessment during the second examination period

Written examination with open questions

Examination methods in case of permanent assessment

Participation, Written examination with open questions

Possibilities of retake in case of permanent assessment

examination during the second examination period is possible

Extra information on the examination methods

Participation in the practical courses is obligatory. A test that directly is dealing with practical course material will test the knowledge of the student. The test score

is part of the final exam score. The final exam is a written test with open questions.

Calculation of the examination mark

Written examination with open questions related to the lecture course material –
85%

Active participation in practical courses + written examination with open questions
related to the practical course experiments – 15%