Course Unit Descriptor

Study Programme: Bachelor Academic Studies in Biochemistry

Course Unit Title: Chemoenzymatic transformations

Course Unit Code: IB-407

Name of Lecturer(s): Associate Professor Bojana Srećo Zelenović

Type and Level of Studies: Bachelor of Science Degree

Course Status (compulsory/elective): elective

Semester (winter/summer): summer

Language of instruction: English

Mode of course unit delivery (face-to-face/distance learning): Face-to-face

Number of ECTS Allocated: 6

Prerequisites: none

Course Aims:

Approaches to complex carbohydrate molecules and their mimetics are facilitated using enzymatic and chemoenzymatic transformations. This will allow students to better understand the important processes in glycobiology such as receptor-mediated recognition and processing of glycoproteins.

Learning Outcomes:

Upon successful completion of this course, the student should be able to:

- Define and justify the application of enzymes *in vitro* synthetic conditions.
- Explain the receptor-mediated recognition of glycobiology and glycoprotein processing.
- Upgrade knowledge about the types and mechanisms of individual enzymatic processes that can be accomplished *in vitro*.

Syllabus:

Theory

Aldol condensation with aldolases: dihydroxyacetone phosphate-dependent aldolase, phosphoenolpiruvate and pyruvate-dependent aldolase, 2-deoxyribose-5-phosphate aldolase and glycine-dependent aldolase. Enzymatic glycosylations: glycosidases and glycosyltransferases. Application of lipases, proteases and oxidoreductases for preparation of chiral starting compounds. Catalysis of specific functional group transformations.

Practice

In accordance with theoretical instruction.

Required Reading:

1. Bojana Srećo Zelenović: Chemoenzymatic transformations, internal script (ePMF), 2019.
2. V. Gotor, I. Alfonso, E. Garcia-Urdiales: Asymmestic Organic Synthesis with Enzymes, Wiley-VCH Verlag, 2008.
3. S. Hanessian: Preparative carbohydrate chemistry, Marcel Dekker, 1997.
4. G.J. Boons, K.J. Hale: Organic Synthesis with Carbohydrates, Shefield Academic Press, 2000.
5. D.L. Levi, P. Fugedi: The Organic Chemistry of Sugars, Taylor&Francis Group, 2006.

Weekly Contact Hours: 4 (60)	**Lectures:** 2 (30)	**Practical work:** 2 (30)

Teaching Methods:

Lectures, laboratory work, seminar(s)

Knowledge Assessment (maximum of 100 points): 100

Pre-exam obligations	points	**Final exam**	points
Active class participation	10	written exam	70
Practical work	10	oral exam	
Preliminary exam(s)		…….	
Seminar(s)	10		
The methods of knowledge assessment may differ; the table presents only some of the options: written exam, oral exam, project presentation, seminars, etc.			