BIOTECH-07:	**MOLECULAR ENZYMOLOGY**
GENERAL INFORMATION	
Course Coordinator(s)	Ljubica Glavaš-Obrovac, PhD, Full prof. with tenure
Associate(s)	Katarina Mišković Špoljarić, PhD, Assist. prof. Teuta Opačak-Bernardi, PhD, Assist. prof. Stana Tokić, PhD, Assist. prof. Barbara Viljetić, PhD, Assist. prof. Marijana Jukić, PhD
Study Programme	Interdisciplinary Graduate Study Programme in English: Biotechnology
Course Status	Obligatory
Year of Study, Semester	1st Year / 2nd Semester
Credits (ECTS)	**6**
Teaching Method (number of classes)	Lectures: 30; Seminars: 15; Exercises: 15
Expected Number of Students in the Course	25-30
COURSE DESCRIPTION	
Course Aims	
The objective of this course is better understanding of enzymatic processes through learning about the structure, physicochemical and catalytic properties of enzymes, as well as learning about the phylogenetic and ontogenetic development of tissue enzymes, the topology and morphometry of enzymes. Knowledge of physiological classification and mechanisms of cellular enzyme exit and extracellular distribution.	
Prerequisites for Enrolment and the Entry Competencies Required for the Course	
Completed undergraduate university study programme from the area of natural sciences (chemistry, biology) or biotechnical sciences, or biomedicine and healthcare.	
Learning Outcomes at the Programme Level Contributed by the Course	
BIOTECH-2; INDBIOT-2; INDBIOT-6; MEDBIOT-1; MEDBIOT-2	
Learning Outcomes at the Course Level	
After completing the course, the student will be able to: 1. Evaluate the relationship of structure and function in protein families. 2. Explain strategies in enzymatic catalysis and ways of collecting and analyzing enzymatic kinetic and thermodynamic data. 3. Classify enzymes significant in clinical practice. 4. Determine the correlation between epigenetic patterns, metabolism and disease development. 5. Analyze biological samples qualitatively and quantitatively using appropriate pre-analytical, analytical and post-analytical methods.	
Course Content	
Lectures. Protein synthesis and regulation. Relationship of structure and function in protein families. Enzymes: Classification and specificity. Interactions between enzymes and coenzymes and prosthetic groups. Mechanisms of enzymatic catalysis and regulation of enzymatic activity. Strategies in enzymatic catalysis: Proteases, carbonic anhydrases, restriction enzymes, NMP kinases. Kinetics of enzymatic reactions - problem solving. Metabolic relationships between tissues and organs. Principles and methods of enzymatic analysis. Collection and analysis of enzymatic kinetic and thermo-dynamic data. Clinical enzymology: Enzymes, isoenzymes and their importance in diagnosis. Clinical enzymology: Regulation of serum and plasma enzyme concentrations. Enzymes significant in clinical practice. Relationship between epigenetic patterns, metabolism and disease development. **Seminars.** Changes in metabolic patterns associated with disease development. Metabolism of	

xenobiotics. Cytochromes P450 and NO synthases. Xenobiotic metabolism - clinical correlations. Metabolome analytical platforms. Metabolic profiling as a tool in understanding metabolism.
Exercises. Isolation of enzymes of plant, animal or mycobacterial origin and determination of kinetics of enzymatic reaction. Quantitative analysis and role of inhibitors on enzyme activity.

Teaching Methods

Lectures; seminars; laboratory exercises; independent assignments

Students' Obligations

Attendance at all forms of classes is mandatory and the students are obligated to attend all knowledge tests. The students may be absent from 30% (full-time students) and 50% (part-time students) of each of the forms of classes, provided that the absence is justified. An exercise or a seminar which has not been completed must be made up through a midterm exam.

Monitoring the Activity of the Students *(Connecting Learning Outcomes, Teaching Methods, and Grading)*

Class-related activity	ECTS	Learning outcome	Student activity	Evaluation method	Grade points	
					Min.	Max.
Attending and active participation (lectures)	0.25	1-5	Attendance at classes	Keeping records	2	10
Seminar work	1.75	1-5	Seminar work	Presentation of seminar work	10	20
Laboratory exercises	1	5	Work in laboratory	Written report	8	20
Final exam	3	1-5	Studying for the final exam	Written exam	30	50
Total	**6**				**50**	**100**

Evaluation of the written part of the final exam

Percentage of correct answers (%)	Grade
>95.00	50
90.00-94.99	47
85.00-89.99	45
80.00-84.99	40
75.00-79.99	38
70.00-74.99	35
65.00-69.99	33
60.00-64.99	30

Forming the final grade:
The points granted for the final exam are added to the grade points awarded during class attendance. The grading process is conducted by absolute distribution, i.e. based on total achievements, and compared to the numerical system in the following manner:
A – Excellent (5): 90-100 grade points; B – Very Good (4): 80-89.99 grade points; C – Good (3): 65-79.99 grade points; D – sufficient (2): 50-64.99 grade points.

Mandatory Literature (available in the library and via other media)

Title	Number of	Availability via

	copies in the library	other media
Wharton CW, Eisenthal R: Molecular Enzymology (Tertiary Level Biology), Blackie & Son Limited, e-book. ISBN 978-1-4615-8532-9.	-	Yes
Additional Literature		
1. Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, Weil PA: *Harper's Illustrated*. *Biochemistry*, 28th Ed., McGraw Hill. Lange Basic Science, 2009. 2. Scientific and professional papers related to particular chapters (available online)		
Quality Assurance Procedures Designed to Ensure the Acquisition of Outcomes and Competencies		
Anonymous, quantitative, standardised student survey on the course and the teacher's work implemented by the Quality improvement office of the Faculty of Medicine Osijek and/or the Faculty of Food Technology Osijek.		
Note		
E-learning is not included in the class quota, but it is used in teaching and it contains links to various sites and video and audio materials available on websites.		