

SUBJECT/COURSE SYLLABUS

1.	Course name in Polish and English Enzymology Enzymologia
2.	Scientific discipline Medical sciences Biotechnology
3.	Language of instruction English
4.	Unit conducting the course Faculty of Biotechnology
5.	Type of course compulsory
6.	Field of study Biotechnology
7.	Level of study first-cycle
8.	Year of study 3rd
9.	Semester summer
10.	Course form and number of hours Lecture, 30 h
11.	Prerequisites in terms of knowledge, skills and social competences for the course: <ul style="list-style-type: none"> • comprehensive knowledge of protein structure, properties, and biological functions; • solid foundation in general, organic, and biophysical chemistry; • proficiency in performing biochemical calculations and applying mathematical analysis to scientific data.
12.	Learning objectives for the course: <ul style="list-style-type: none"> • explain enzyme kinetics and reaction parameters; • describe mechanisms of catalysis and inhibition; • analyze the effects of pH and temperature on enzymatic activity; • detail enzyme structure and active site composition.
13.	Curriculum content:

	<ul style="list-style-type: none"> • introduction to enzymology: definitions, catalysis, and reaction rates; • factors affecting enzymatic activity (pH, temperature, concentrations); • allosteric regulation and cooperative binding; • enzyme - substrate binding and chemical equilibria; • thermodynamics of enzyme - catalyzed reactions; • nomenclature and classification of enzymes (IUBMB system); • enzyme inhibition: reversible and irreversible mechanisms; • industrial applications of enzymes; • clinical and diagnostic aspects of enzymology. 	
14.	<p>Description of learning outcomes</p> <p>Student:</p> <ul style="list-style-type: none"> • explains the physicochemical principles of enzymatic catalysis, including kinetic parameters, substrate binding mechanisms, and the impact of environmental factors (pH, temperature) on enzyme activity; • defines and classifies enzymes according to the IUBMB nomenclature system; • describes active site structures and the role of specific amino acid residues in catalysis; • describes the thermodynamics of enzymatic reactions and mechanisms of enzyme regulation, with a particular focus on allostery; • characterizes reversible and irreversible inhibition mechanisms and their significance in the mechanisms of action of selected drugs; • presents selected applications of enzymes in industrial processes and applied biotechnology; • uses mathematical tools to determine and interpret kinetic parameters (e.g., Michaelis constant, maximum velocity). • demonstrates an understanding of the necessity for lifelong learning and monitoring scientific literature to keep pace with rapidly evolving enzymatic technologies in biomedicine and industry; • understands the importance of careful planning in scientific experiments and recognizes when it is necessary to consult with experts to solve complex problems. 	<p>Symbols for relevant directional learning outcomes:</p> <p>K1_W01, K1_W02,</p> <p>K1_W01</p> <p>K1_W06</p> <p>K1_W08, K1_W09</p> <p>K1_W09</p> <p>K1_U03, K1_U06</p> <p>K1_K01</p> <p>K1_K03</p>
15.	<p>Recommended literature:</p> <ul style="list-style-type: none"> • Structure and Mechanism in Protein Science: A Guide to Enzyme Catalysis and Protein Folding: Alan Fersht, W. H. Freeman; 	

	<ul style="list-style-type: none"> • Enzyme Kinetics: Behavior and Analysis of Rapid Equilibrium and Steady-State Enzyme Systems: Irwin H. Segel, Wiley-Interscience. 	
16.	Methods of verification of the assumed learning outcomes: <ul style="list-style-type: none"> • oral or written examination 	
17.	Conditions and form of credit for individual components of the course: <ul style="list-style-type: none"> • passing the examination. 	
18.	Student workload expressed in teaching hours and ECTS credits	number of hours allocated for the course of a given type of classes
	classes (according to the study plan) with the instructor: <ul style="list-style-type: none"> • lecture 	30 h
	student's own work (including participation in group work) e.g.: <ul style="list-style-type: none"> • ongoing preparation for classes; • reviewing recommended literature; • preparation for the final exam. 	40 h
	Total number of class hour	70 h
	Number of ECTS credits:	3 ECTS