COURSE DESCRIPTION (SYLLABUS)

1.	Course: **Protein Biotechnology**
2.	Language of instruction: **English**
3.	Faculty: **Faculty of Biotechnology**
4.	Course/module code: **29-BT-S2-E1-EngPb**
5.	Course/module type (*mandatory* or *elective*): **mandatory**
6.	Programme: **Medical Biotechnology**
7.	Study cycle: **2nd cycle**
8.	Year: **1st**
9.	Semester (*autumn* or *spring*): **Autumn**
10.	Form of tuition and number of hours: **Laboratory, 30 h**
11.	Name, Surname, academic title: **Małgorzata Zakrzewska, Prof.**
12.	Initial requirements (knowledge, skills, social competences) regarding the course/module and its completion **Knowledge in the field of structure and function of proteins, biophysics, biochemistry.**
13.	Objectives: **The aim of the laboratory is to teach students methods of protein stability analysis with the use of spectroscopic methods (circular dichroism, fluorescence of tryptophan residues) and limited proteolysis, on the example of FGF1 protein variants.**
14.	Content: **The individual steps of exercise include:** • **preparation of buffers and determination of protein concentrations;** • **proteins desalting;** • **chemical denaturation of FGF1 variant using guanidine hydrochloride followed by measurement of fluorescence changes of tryptophan residue;** • **thermal denaturation of the FGF1 variant followed by measurement of changes in the circular dichroism signal (ellipticity changes);** • **limited proteolysis of FGF1 variant with trypsin;** • **SDS-PAGE electrophoresis and evaluation of proteolysis;** • **numeric analysis of denaturation curves obtained from thermal and chemical denaturation. Determination of thermodynamic parameters (T_m, ΔH, $GdmCl_{1/2}$, m,**

	ΔG), comparison of denaturation parameters obtained for different protein variants.	
15.	Learning outcomes: • **Provide qualitative and quantitative descriptions of complex biological phenomena and processes on biophysical level.** • **Possess advanced knowledge of medical and biological sciences, namely protein biotechnology and protein engineering.** • **Possess in-depth knowledge of structural biology essential in understanding relationships and interrelations in protein biotechnology.** • **Possess knowledge of the current issues prevailing in scientific literature in scope of protein biotechnology.** • **Apply advanced technology and research tools in medical and biological sciences, biotechnology.** • **Efficiently make use of scientific literature in the field of protein biotechnology; read professional literature in English.** • **Show ability in critically analysing and selecting information in the field of protein biotechnology, especially from electronic resources, including literature and sequential databases.** • **Plan and perform research tasks and analysis under the supervision of a tutor in the field of protein biotechnology.** • **Collect and interpret experimental data, synthesise it and make appropriate conclusions in the field of protein biotechnology.** • **Write research papers and brief scientific reports in English based on his or her own research.** • **Show ability to formulate legitimate opinions in the field of protein biotechnology on the basis of data derived from different sources.** • **Collaborate and work as part of a team in order to plan research and solve problems in the field of protein biotechnology.** • **Adequately prioritise in order to carry out specific research projects in the field of protein biotechnology.** • **Understand the need for a systematic review of professional literature in order to broaden and deepen his or her knowledge in the field of protein biotechnology.**	Outcome symbols: K_W01, K_W03, K_W04, K_W05 K_U01, K_U02, K_U03, K_U04, K_U06, K_U07, K_U09 K_K02, K_K03, K_K05
16.	Recommended literature: • **Perutz M, 1992, Protein structure, Freeman, New York.**	

<table>
<tr><td></td><td colspan="2">Rees AR, Sternberg MJE, Wetzel R, 1992, Protein engineering: A practical approach, IRL Press, Oxford.
Brooks CL, Karplus M, Pettitt BM, 1988, Proteins: A Theoretical Perspective of Dynamics, Structure, and Thermodynamics, Wiley-Interscience.</td></tr>
<tr><td>17.</td><td colspan="2">Methods of verification of the assumed learning outcomes:
written report
written test</td></tr>
<tr><td>18.</td><td colspan="2">Conditions of earning credits:
written report
written test</td></tr>
<tr><td rowspan="5">19.</td><td colspan="2">Student’s workload:</td></tr>
<tr><td>Activity</td><td>Number of hours for the activity</td></tr>
<tr><td>Hours of instruction (as stipulated in study programme):</td><td>30 h</td></tr>
<tr><td>Student’s own work:</td><td>10 h</td></tr>
<tr><td>Total number of hours:</td><td>40 h</td></tr>
<tr><td></td><td>Number of ECTS:</td><td>2 ECTS</td></tr>
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