COURSE DESCRIPTION (SYLLABUS)

1.	Course: **Experimental Techniques in Structural Biology**
2.	Language of instruction: **English**
3.	Faculty: **Faculty of Biotechnology**
4.	Course/module code: **29-BT-S2-E1-EngEXTSc**
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*): **spring**
10.	Form of tuition and number of hours: **Laboratory, 40 h**
11.	Name, Surname, academic title: **Daniel Krowarsch, PhD**
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, bioinformatics.**
13.	Objectives: **The aim of the course is to learn methods of protein crystallization, assessing quality analysis of spatial structures of macromolecules, work with electron density maps.**
14.	Content: **Preparation of buffers for protein crystallisation. Crystallization of protein by sitting and hanging drop, observation of crystal growth. Mounting a crystal in a loop or capillary.** **Visualization of spatial structures obtained by X-ray diffraction or NMR.** **Analysis of the quality of protein atomic structures, imaging of asymmetric unit, crystal contacts, temperature factors. Calculation and visualization of macromolecules surface.** **Localization of secondary structures and analysis of structure quality based on stereochemical parameters. Identification of hydrogen bonds and Van der Waals**

	interactions. **Work with electronic density maps, map visualization. Fitting residues into electron density map.**	
15.	Learning outcomes: Students: • **provide qualitative and quantitative descriptions of complex biological phenomena and processes on atomic level;** • **possess advanced knowledge of medical and biological sciences, namely structural biology;** • **possess in-depth knowledge of structural biology essential in understanding relationships and interrelations in biological systems;** • **possess knowledge of the current issues prevailing in scientific literature in scope of structural biology;** • **apply advanced technology and research tools in medical and biological sciences, structural biology;** • **efficiently make use of scientific literature in the field of structural biology; read professional literature in English;** • **show ability in critically analysing and selecting information in the field of structural biology, 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 structural biology;** • **collect and interpret experimental data, synthesise it and make appropriate conclusions;** • **show ability to formulate legitimate opinions in the field of structural biology on the basis of data derived from different sources;** • **write research papers and brief scientific reports in English based on his or her own research;** • **collaborate and work as part of a team in order to plan research and solve problems in the field of structural biology;** • **adequately prioritise in order to carry out specific research projects in the field of structural biology;** • **understand the need for a systematic review of professional literature in order to broaden and deepen his or her knowledge in the field of structural biology.**	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:	

<table>
<tr><td></td><td colspan="2">• Crystallization of Biological Macromolecules, A. McPherson, 1999. CSHL Press.</td></tr>
<tr><td>17.</td><td colspan="2">Methods of verification of the assumed learning outcomes:
• written report,</td></tr>
<tr><td>18.</td><td colspan="2">Conditions of earning credits:
• written report.</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):
laboratory</td><td>40 h</td></tr>
<tr><td>Student’s own work:
• preparation before classes
• reading literature
• writing course report</td><td>40 h</td></tr>
<tr><td>Total number of hours:</td><td>80 h</td></tr>
<tr><td></td><td>Number of ECTS:</td><td>3 ECTS</td></tr>
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