COURSE DESCRIPTION (SYLLABUS)

1.	Course: **Biochemical Calculations**
2.	Language of instruction: **English**
3.	Faculty: **Faculty of Biotechnology**
4.	Course/module code: **29-BT-S1-E2-EnBCc**
5.	Course/module type (*mandatory* or *elective*): **mandatory**
6.	Programme: **Biotechnology**
7.	Study cycle (*1st/2nd*): **1st cycle**
8.	Year: **1st**
9.	Semester *(autumn* or *spring):* **Spring**
10.	Form of tuition and number of hours: **Tutorial, 45 h**
11.	Course coordinator(s): **Agata Szalewicz, PhD**
12.	Initial requirements (knowledge, skills, social competences): **Knowledge of general chemistry, concerning especially electrolytes solutions and reactions therein, computational skills concerning expressing solutions concentrations. In addition, mathematical calculative skills concerning finding solution of the quadratic equation, knowledge of exponential and logarithmic functions, and calculating with the use of scientific notation are required.**
13.	Objectives: **Students are intended to gain calculating skills indispensable for their further proper work in laboratory and experimental data analysis.**
14.	Content: **1. Electrolytes: ionic strength, activity coefficients and activity of ions in solution.** **2. Weak electrolytes solutions; Bronsted concept of conjugate acid-base pairs, (K_a, K_b).** **3. Hydrolysis of salts of weak acids and weak bases (hydrolysis constant, degree of**

<table>
<tr><td></td><td colspan="2">hydrolysis, pH of salt solutions).
4. Buffers solutions: pH of buffer solutions (Henderson-Hasselbalch equation), buffer concentration; buffer capacity; preparing buffers solutions.
5. Spectrophotometry: Absorbance (A) versus percent transmittance (T, T%); Beer-Lambert law; Molar/specific extinction coefficient; determination of substance concentration in solution based on its optical density.</td></tr>
<tr><td>15.</td><td>Learning outcomes:
Student:
• understands and is able to quantitatively describe reactions in strong and weak electrolyte solutions (dissociation, hydrolysis);
• is able to make calculations and prepare buffer solutions of required concentration and pH;
• is theoretically prepared to use spectrophotometrical techniques in quantitative determination methods;
• reads and understands scientific literature in the field of general and analytical chemistry;
• learns a given subject by himself from the indicated literature or from other resources (also available online);
• uses scientific language from the field of general and analytical chemistry in discussions about calculational problems;
• understands the need for careful theoretical planning and preparing for scientific experiments.</td><td>Outcome symbols:
K1_W02, K1_W04, K1_U03, K1_U04, K1_U09, K1_U12, K1_K01, K1_K03</td></tr>
<tr><td>16.</td><td colspan="2">Recommended literature:
• Gary D.Christian, Purnendu K. Dasgupta, Kevin A Schug „Analytical Chemistry” Wiley , Seventh Edition, 2014.
• Douglas A. Skoog, Donald M. West, F. James Holler, Stanley R. Crouch „Skoog and West’s Fundamentals of Analytical Chemistry”. 9th Edition, CENGAGE Learning, 2014.
• Kris Moorthy: „Fundamentals of Biochemical Calculations” CRC Press, 2008.</td></tr>
<tr><td>17.</td><td colspan="2">Methods of verification of the assumed learning outcomes:
• tests (written form) performed after each section of the course;
• individual student’s work (solving problems) at class.</td></tr>
<tr><td>18.</td><td colspan="2">Conditions of earning credits:
• Completing the course (Passing all tests);
• The presence and active participation in class.</td></tr>
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19.	Student's workload:	
	Activity	Number of hours for the activity
	Hours of instruction (as stipulated in study programme) : • classes: **45 h** • consultations: **15 h**	60 h
	Student's own work • preparation before class : **30 h** • preparing for tests: **30 h**	60 h
	Total number of hours:	**120 h**
	Number of ECTS:	**4**