

Nazwa zajęć/ <i>Course title:</i>	<b>Podstawy inżynierii procesów biotechnologicznych</b>	<b>ECTS</b>	<b>6</b>
Nazwa zajęć w j. angielskim/ <i>Course title in English:</i>	<b>Basic of engineering of biotechnological processes</b>		
Zajęcia dla kierunku studiów/ <i>Degree program name:</i>	<b>Biotechnology</b>		

Język kursu/ <i>Course language:</i>	English	Poziom studiów/ <i>Study level:</i>	I
Typ studiów/ <i>Form of studies:</i>	x intramural .. extramural	Status zajęć/ <i>Course status</i>	.. podstawowe/ <i>Basic</i> .. obowiązkowe/ <i>x mandatory</i> .. kierunkowe/ <i>x major</i> .. do wyboru/ <i>elective</i>
		Semestr/ <i>Semester:</i>	3 X semestr zimowy/ <i>winter semester</i> semestr letni/ <i>summer semester</i>
	Rok akademicki/ <i>Academic year:</i>	2022/2023	Numer katalogowy/ <i>Catalogue number:</i> <b>BBT_BTa-1S-3Z-21</b>

Koordynator zajęć/ <i>Course coordinator:</i>	<b>Dr hab. Ewa Jakubczyk, prof.</b>			
Prowadzący zajęcia/ <i>Teachers responsible for the course:</i>	Staff of Department of Food Engineering and Process Management			
Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i>	<p>Transfer of knowledge about the basic processes occurring during the course of a biotechnological process, indication of the possibility of design of process conditions taking into account the requirements of both process engineering and biological material, and explaining the mutual interactions between process and biological material</p> <p>The lectures include the following content:</p> <ul style="list-style-type: none"> <li>• General characteristics of the biotechnological process and its specificity;</li> <li>• Basics of momentum, heat and mass transfer as basic processes conditioning the course of a biotechnological process;</li> <li>• Preparation of the biotechnological process from the technical side and selection of the correct procedure related to the preparation of biological material (storage methods, counteracting stress reactions, activating the material)</li> </ul> <p>The exercises cover the following issues:</p> <ul style="list-style-type: none"> <li>• balancing of biotechnological processes;</li> <li>• basics of heat transfer,</li> <li>• principles of operation of heat exchangers</li> <li>• basics of mass transfer,</li> <li>• the efficiency of dissolving gases in the substrate</li> <li>• conditions for the formation of foams and methods of counteracting this phenomenon,</li> <li>• efficiency of mixing processes;</li> <li>• rheological properties of materials</li> <li>• the flows of fluids</li> </ul>			
Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i>	a)	Lectures; 30 hours ;		
	b)	Laboratory classes ; 30 hours;		
Metody dydaktyczne/ <i>Teaching methods:</i>	lecture, conversational lecture, experiment, discussion, possibilities of using distance learning when necessary			
Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i>	mathematics, physical chemistry the student has the skills of calculations including integration, differentiation, using a spreadsheet in the area of calculations and the graphical presentation and interpretation of results; knows the basics of physics phenomena			
Efekty uczenia się/ <i>Learning outcomes:</i>	treść efektu przypisanego do zajęć/ <i>the content of the effect assigned to the course:</i>		Odniesienie do efektu kierunkowego/ <i>Relation to the course outcomes</i>	Siła dla ef. kier*/ <i>Impact on the course outcomes*</i>
Wiedza (absolwent zna i rozumie) <i>/Knowledge: (the graduate knows and understands)</i>	W1	understands the processes (the exchange of heat, momentum, mass) occurring during a biotechnological process	K_W02	1
	W2	understands the impact of process conditions on the biological material	K_W07	2
	W3	has knowledge about the devices and their instrumentation (measurement sensors) used in biotechnological production	K_W04	2
			K_W07	2
			K_W14	3
	W4	knows the principles of OHS	K_W15	3
Umiejętności (absolwent potrafi) <i>/Skills: (the graduate is able to)</i>	U1	ables to conduct an experiment according to the instruction and analyses the collected results	K_W11	3
			K_U04	1
			K_U06	2
			K_U11	1
			K_U13	2
			K_U12	2

			K_U10 K_U15 K_U08 K_U09 K_U14	1 1 2 3 2
Kompetencje (absolwent jest gotów do) /Competences: (The graduate is ready to)	K1	ready to work with team	K_K02	3
<i>Treści programowe zapewniające uzyskanie efektów uczenia się:</i>  <i>/Program contents ensuring the achievement of the learning outcomes:</i>	Basic processes occurring during the course of a biotechnological process, indication of the possibility of design of process conditions taking into account the requirements of both process engineering and biological material, and explaining the mutual interactions between process and biological material.			
Sposób weryfikacji efektów uczenia się/ <i>Methods of the verification of the learning outcomes:</i>	a mark for written papers examining the theoretical preparation, a mark for reports on the performance of experiments, exam,			
Szczegóły dotyczące sposobów weryfikacji i form dokumentacji osiąganych efektów uczenia się <i>/Details on the verification methods and of the ways of documenting the learning outcomes:</i>	reports; personal evaluation cards of the student, the content of the examination questions with the assessment, the possibility of using distance education when necessary			
Elementy i wagi mające wpływ na ocenę końcową/ <i>Elements and weights influencing the final grade:</i>	The assessment of the learning outcomes consists of: 1. assessment of written works checking theoretical preparation for conducting experiments 2. presentation and analysis of observations and conclusions formulated in the reports 3. written exam The student obtains 3 partial grades (for each element). The condition for passing each element is obtaining 51% The final grade is computed based on the grades for each item. The weight of each of these components is as follows: 1-40%, 2-10%, 3-50% The condition for passing the course is to pass each element and obtain a minimum grade that is sufficient, taking into account all the elements.			
Miejsce realizacji zajęć/ <i>Teaching place:</i>	Laboratories and lecture halls, on-line if necessary			
Literatura/Literature: 1. Introduction to food process engineering / Albert Ibarz, Gustavo V. Barbosa-Cánovas. Boca Raton [etc.] : CRC Press/Taylor & Francis, cop. 2014. 2. Automation for food engineering : food quality quantization and process control / Yanbo Huang, A. Dale Whittaker, Ronald E. Lacey. Boca Raton : CRC Press, 2001. 3. Advances in food biotechnology / edited by Ravishankar Rai V., Chichester : Wiley Blackwell, cop. 2016.				
UWAGI/ANNOTATIONS The following scale is used to calculate the final score: 100-91% points - 5.0; 90-81% points - 4.5, 80-71% points - 4.0; 70-61% points - 3.5; 60-51% points - 3.0				

\*) 3 – zaawansowany i szczegółowy, 2 – znaczący, 1 – podstawowy/ 3 – significant and detailed, 2 – considerable, 1 – basic,

Wskaźniki ilościowe charakteryzujące moduł/przedmiot/*Quantitative summary of the course:*

Szacunkowa sumaryczna liczba godzin pracy studenta (kontaktowych i pracy własnej) niezbędna dla osiągnięcia zakładanych dla zajęć efektów uczenia się - na tej podstawie należy wypełnić pole ECTS / <i>Estimated number of work hours per student (contact and self-study) essential to achieve the presumed learning outcomes - basis for the calculation of ECTS credits:</i>	142....h
Łączna liczba punktów ECTS, którą student uzyskuje na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich lub innych osób prowadzących zajęcia/ <i>Total number of ECTS credits accumulated by the student during contact learning:</i>	...2.4..... ECTS