

Nazwa zajęć/ <i>Course title:</i>		<b>Biotechnologiczne wykorzystanie bakterii</b>			ECTS	2
Nazwa zajęć w j. angielskim/ <i>Course title in English:</i>		<b>Biotechnological use of bacteria</b>				
Zajęcia dla kierunku studiów/ <i>Degree program name:</i>		Biotechnologia				
Język kursu/ <i>Course language:</i>		English		Poziom studiów/ <i>Study level:</i>		
Typ studiów/ <i>Form of studies:</i>	<input checked="" type="checkbox"/> intramural <input type="checkbox"/> extramural	Status zajęć/ <i>Course status</i>	podstawowe/ <i>Basic</i> X kierunkowe/ <i>major</i>	obowiązkowe/ <i>mandatory</i> x do wyboru/ <i>elective</i>	Semestr/ <i>Semester:</i> 5	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>	BBT_BTa-1S-5Z-42_3	
Koordynator zajęć/ <i>Course coordinator:</i>		Dr hab. inż. Iwona Gientka, prof. SGGW				
Prowadzący zajęcia/ <i>Teachers responsible for the course:</i>		Dr hab. inż. Iwona Gientka, prof. SGGW; the employees of the Department of Food Biotechnology and Microbiology				
Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i>		<p><b>The aim of the lectures</b> is to familiarize students with the possibilities of biotechnological use of bacteria, regulation of biochemical pathways conditioning the overproduction of desired metabolites, technology of their production, purification and application. The aim of the exercises is to familiarize students with the biosynthesis of selected industrial metabolites</p> <p><b>Lectures:</b> Overview of the conditions for obtaining selected biotechnological products with the participation of bacteria and the regulation of their metabolism. Traditional and innovative applications of bacteria in various branches of biotechnology.</p> <p><b>Classes:</b> Conducting the processes of biosynthesis and secretion of selected biotechnological products with the participation of bacteria (independent work and in teams), with the analysis of their course (microbiological and physicochemical parameters), calculation of the efficiency of the process, interpretation of results and formulation of conclusions, as well as the practical application of the produced bacterial metabolites.</p> <p>Each team has a properly equipped workplace (microscope, glass, small glass equipment, pipettes, loops, etc.) as well as access to laboratory equipment (shakers, spectrophotometers, incubators, distillation apparatus, water baths, titration kits, pH meters), scales, cell immobilization kits) and to the appropriate biological material and media with which it conducts experiments.</p>				
Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i>		a) Lecture ; 15h.; b) Laboratory classes; 15h;				
Metody dydaktyczne/ <i>Teaching methods:</i>		Lectures/ on-line lectures, laboratory experiments,				
Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i>		general microbiology, general biotechnology, biochemistry, physicochemical analytics The student should: know the general characteristics of prokaryotes, know the basics of biochemistry and biotechnological processes, be able to perform basic physicochemical analyses, know and be able to use basic microbiological techniques.				
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:</i> (the graduate knows and understands)	W1	lists the possibilities of using prokaryotic organisms in biotechnology			K_W06 K_W09	3 2
	W2	understands the mechanisms of regulation of bacterial metabolism in order to overproduce metabolites			K_W06 K_W09 K_W13 K_W08	3 2 3 2
	W3	characterizes the bacteria used in the biotechnological process and knows the conditions of their cultivation in order to produce the desired metabolite			K_W06 K_W09 K_W13 K_W08	3 2 3 2
Umiejętności (absolwent potrafi) <i>/Skills:</i> (the graduate is able to)	U1	knows how to carry out the process of obtaining selected biotechnological products with the use of bacteria			K_U01 K_U06 K_U21	3 2 2
	U2	uses basic experimental and analytical techniques important in the control of biotechnological processes involving bacteria			K_U01 K_U06	3 2
	U3	can interpret the results of determinations important in biotechnological processes involving bacteria and formulate conclusions			K_U21	2

Kompetencje (absolwent jest gotów do) /Competences: (The graduate is ready to)	K1	is ready to apply knowledge in the microbial and biotechnological laboratory	K_K03	1
Treści programowe zapewniające uzyskanie efektów uczenia się: /Program contents ensuring the achievement of the learning outcomes:		The student learns the methods and goals of the biotechnological use of bacteria for the overproduction of selected compounds and the techniques of their acquisition and purification.		
Sposób weryfikacji efektów uczenia się/ Methods of the verification of the learning outcomes:		Learning outcome W1, W2, U1 - written exam Learning outcomes U1, U2, O3, K1 - tests during classes and preparation of a team analysis of a defined experiment /the possibility of using on-line learning when necessary		
Szczegóły dotyczące sposobów weryfikacji i form dokumentacji osiągniętych efektów uczenia się /Details on the verification methods and of the ways of documenting the learning outcomes:		Colloquiums with the evaluation, team evaluation of the experiment analysis (evaluation report), the content of the examination questions with the assessment, the possibility of using distance learning when necessary		
Elementy i wagi mające wpływ na ocenę końcową/ Elements and weights influencing the final grade:		1. Assessment of the test and experiments performed during the classes - 50% 2. Examination - 50%		
Miejsce realizacji zajęć/ Teaching place:		Lectures room / on-line lectures via MS Teams and laboratory room (building 32, Department of Food Biotechnology and Microbiology)		
Literatura/Literature:  Mandatory and supportive materials Glazer A.N., Nikaido H. Microbial biotechnology – Fundamentals of Applied Microbiology, Second Edition, Cambridge University Press 2007. eBook available for free. Supportive materials (review papers, and books' chapters) will be provided by lecturer.				
UWAGI/ANNOTATIONS Tests are assessed according to the scale 51% of knowledge = satisfactory (3.0) and, consequently, the thresholds 61% (3.6), 71% (4.0), 81% (4.5), 91% (5.0)				

\*) 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 /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:	55 h
Łączna liczba punktów ECTS, którą student uzyskuje na zajęciach wymagających bezpośredniego udziału nauczycieli akademickich lub innych osób prowadzących zajęcia/ Total number of ECTS credits accumulated by the student during contact learning:	1.2 ECTS