Nazwa zajęć/*Course title*:	**Bezpieczeństwo chemiczne w środowisku i szacowanie ryzyka chemicznego**	**ECTS**	**4**
Nazwa zajęć w j. angielskim/ *Course title in English*:	**Chemical safety**		
Zajęcia dla kierunku studiów/ *Degree program name*:	**Biotechnology**		

Język kursu/ *Course language*:	English		Poziom studiów/*Study level:*	I
Typ studiów/ *Form of studies*:	x intramural .. extramural	Status zajęć/ *Course status*	podstawowe/ *Basic* x kierunkowe/ *major* X obowiązkowe/ *mandatory* do wyboru/ *elective*	Semestr/*Semester:* 7	x semestr zimowy/ *winter semester* semestr letni/ *summer semester*
Rok akademicki/*Academic year:*	**2022/2023**	Numer katalogowy/ *Catalogue number:*	**BBT_BTa-1S-7Z-48**		

Koordynator zajęć/Course coordinator:	**Dr n. wet. Magdalena Chłopecka**
Prowadzący zajęcia/ *Teachers responsible for the c*ourse:	Dr n. wet. Magdalena Chłopecka; Dr n. wet. Natalia Dziekan, Dr n. wet. Marta Mendel, Dr n. wet. Piotr Bąska
Założenia, cele i opis zajęć/ *Aims, objectives and description of the course:*	The aim of the course is to familiarize students with the problems of environmental pollution, paying particular attention to the basic sources of pollution, the fate of toxic compounds in the environment, biological effects on living organisms, systems and scopes of monitoring the presence of xenobiotics in the environment. These issues serve to develop the ability to assess the risk of a hazard resulting from exposure to toxic compounds already present as well as newly introduced into the environment. The implementation of the course is based on the discussion of the following issues: Toxicology as a scientific discipline and its scope. Chemical safety, including the classification of poisons and methods and labeling in accordance with the latest regulations. Toxicological relationships. Factors influencing the possibility of xenobiotic harmful effects on living organisms. Toxokinetics and toxodynamics. Principles and scope of toxicometric tests required for placing xenobiotics (including biotechnological products) on the market. Chemical exposure level indicators. Risk assessment of exposure to the toxic effects of pesticides and halogenated aromatic hydrocarbons. Toxicology of plastics and organic solvents. Systems and modern methods of monitoring xenobiotics and their legal conditions. Basics of toxicological analysis (methods of extracting poisons from biological material, their detection). Determination of the enzymatic profile of blood plasma and the activity of enzymes in tissues as an example of the assessment of the degree of toxic action of xenobiotics. Metal pollution of the environment and the consequences of exposure (seminar). Problems related to nitrification of the natural environment.
Formy dydaktyczne, liczba godzin/ *Teaching forms, number of hours*:	a) lectures; number of hours 30; b) laboratory classes; number of hours 15;
Metody dydaktyczne/*Teaching methods:*	In order to implement the subject, various forms of transferring knowledge and activating students are planned. These methods include activities such as: analysis of source texts and solving the presented problems through a joint discussion on the material presented in the lectures, also conducting experiments in a practical way illustrating the issues presented, and group projects of students in the form of seminars prepared by them, the possibility of using distance learning in cases of necessary
Wymagania formalne i założenia wstępne/ *Formal requirements and prerequisites*	chemistry, animal physiology, biochemistry A student starting the course should know the basic physiological and biochemical processes taking place in animal and plant organisms.

Efekty uczenia się/*Learning outcomes:*		treść efektu przypisanego do zajęć/*the content of the effect assigned to the course:*	Odniesienie do efektu kierunkowego /*Relation to the course outcomes*	Siła dla ef. kier* /*Impact on the course outcomes **
Wiedza (absolwent zna i rozumie) /*Knowledge*: *(the graduate knows and understands)*	W1	knows and understands the basic principles of chemical safety in the environment	K_W02 K_W06 K_W07 K_W08 K_W09 K_W10 K_W11	2 3 2 3 2 3 2
Umiejętności (absolwent potrafi) /*Skills*: *(the graduate is able to)*	U1	can discuss and classify the basic methods of toxicological analysis and interpret the obtained results	K_U01 K_U02 K_U21	2 2 2

	U2	can list and present in the form of a presentation the basic environmental pollution as well as systems and modern methods of monitoring xenobiotics along with their legal conditions	K_U01 K_U10 K_U21 K_U22	2 2 2 2
	U3	can distinguish and describe the basic biomarkers that allow to assess the degree of environmental pollution and on the basis of their values estimate the risk of danger to human and animal health	K_U05 K_U12 K_U21	2 2 2
	U4	is able to list and explain the rules and scope of toxicometric tests required when introducing xenobiotics (including biotechnological products) to the market	K_U05 K_U07	2 2
Kompetencje (absolwent jest gotów do) /Competences: (The graduate is ready to)	K1	is ready to put knowledge into practice	K_K02	1

Treści programowe zapewniające uzyskanie efektów uczenia się: */Program contents ensuring the achievement of the learning outcomes:*	To familiarize students with the issues of environmental pollution, paying particular attention to the basic sources of pollution, the fate of toxic compounds in the environment, biological effects on living organisms, systems and scopes of monitoring the presence of xenobiotics in the environment. Developing the ability to assess the risk of a hazard resulting from exposure to toxic compounds already present as well as newly introduced into the environment.
Sposób weryfikacji efektów uczenia się/ *Methods of the verification of the learning outcomes:*	oral test, written exam,
Szczegóły dotyczące sposobów weryfikacji i form dokumentacji osiąganych efektów uczenia się /Details on the verification methods and of the ways of documenting the learning outcomes:	The content of the final and exam questions along with the grade, the possibility of using distance learning when necessary
Elementy i wagi mające wpływ na ocenę końcową/*Elements and weights influencing the final grade:*	Passing the exercises: it is 100% of the issued grade, the grade from the exercises is equivalent to the final grade for the exercise part of the subject, the final grade from 2-5 exam - 100% of the grade, the exam grade is equivalent to the final grade for the lecture part of the subject, the final grade is 2-5
Miejsce realizacji zajęć/ *Teaching place:*	Lecture hall, seminar rooms, laboratories

Literatura podstawowa i uzupełniająca:

Piotrowski J. (red). Podstawy Toksykologii, Wydawnictwa Naukowo-Techniczne, Warszawa, 2006(wybrane zagadnienia)
2. Seńczuk W. (red.). Toksykologia, PZWL, Warszawa 1999, 2000 (wybrane zagadnienia)
3. Garwacki S., Wiechetek M.: Weterynaryjna Toksykologia Ogólna, Dział Wydawnictw SGGW, 1994 r. (wybrane zagadnienia)
4. Monografie z serii "Kryteria Zdrowotne Środowiska" (przekłady na język polski wydawnictw WHO)
5. Fan A.M. i Chang L.W. (red). Toxicology and Risk Assessment. Principles, methods and Aplplication. Marcel Dekker, Inc New york, 1996.
6. Original papers, up to date at a given time, recommended by lecturers

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 /*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:*	102h
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:*	1.8 ECTS