

Nazwa zajęć/ <i>Course title:</i>	Kultury komórkowe i tkankowe	ECTS	6
Nazwa zajęć w j. angielskim/ <i>Course title in English:</i>	Cell and tissue cultures		
Zajęcia dla kierunku studiów/ <i>Degree program name:</i>	Biotechnology		

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> X kierunkowe/ <i>major</i>	X obowiązkowe/ <i>mandatory</i> .. do wyboru/ <i>elective</i>	Semestr/ <i>Semester:</i>	6 semestr zimowy/ <i>winter semester</i> X semestr letni/ <i>summer semester</i>	
Rok akademicki/ <i>Academic year:</i>				2022/2023	Numer katalogowy/ <i>Catalogue number:</i>	BBT_BTa-1S-6L-43	

Koordynator zajęć/ <i>Course coordinator:</i>	Prof. dr hab. Wojciech Płader							
Prowadzący zajęcia/ <i>Teachers responsible for the course:</i>	Prof. dr hab. Wojciech Płader, dr inż. Piotr Bąska, employees / PhD students of KGHIBR							
Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i>	<p>The course covers knowledge and skills in the field of modern plant biotechnology and animals. The lecture is designed to familiarize you with the theoretical foundations of in vitro culture, while in the practical part, students acquire the skills to use the most important techniques of plant and animal cultures by practically carrying out specific experiments. Students are working in chambers with vertical laminar airflow that meet the requirements of class II biosafety (Biohazard)</p> <p>Lectures: (I) morphogenetic abilities of plant cells, preparation of plant material, nutrients, physical conditions of the culture; growth regulators in plant in vitro cultures; methods of vegetative reproduction; microbial contamination and antibiotic therapy; obtaining haploid plants and doubled haploids; protoplast culture and fusion; selection and testing of features in culture in vitro (somaclonal variability, selection conditions and its effectiveness); (II) types of cell culture and tissues; primary cultures: methods of isolation, purification and identification of cells on the example of cells of various organs; establishing and running primary farms; assessment of the physiological state of isolated cells: indicators of cell viability and metabolic activity; cell lines: types, growth assessment, maintenance of cell lines, kinetics of cell culture, passage, development of cell lines; characteristics of selected cell lines; stem cells: sources of stem cells, methods of isolating and culturing stem cells; advantages and limitations of cell culture and tissues.</p> <p>Classes: (I) learning about the structure, basic equipment and principles of the in vitro plant culture laboratory; learning sterile work; learning about the structure, principles of operation and methods of use with optical devices for monitoring plant cells, tissues and organs in vitro, familiarizing students (in the form of planned experiments) with the basic and some advanced techniques of plant cultures; team analysis of emerging technologies in in vitro plant cultures (based on for an independent literature review of the subject) - case study / project development</p> <p>(II) learning the basic principles of working in the animal cell culture laboratory on examples: 1) rat hepatocytes: a) isolation of hepatocytes, establishment and cultivation of cultures, b) assessment of survival and metabolic activity of the cultures grown using various indicators; 2) isolated tissues and organs: a) isolation of gastrointestinal tracts, rats and their incubation, evaluation of the influence of selected factors on the reaction of the muscular tissue in food sections, b) evaluation of the kinetics of selected compounds and their metabolism in isolated perfused porcine liver; interpretation of the obtained results.</p>							
Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i>	a) lecture number of hours 20 b) laboratory classes number of hours 45							
Metody dydaktyczne/ <i>Teaching methods:</i>	lecture, discussion, individual and / or group student projects, experiment, consultations, the possibility of using distance learning when necessary							
Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i>	chemistry, biochemistry, botany, cell biology, molecular biology, microbiology, genetics, plant and animal physiology ability to work in a biological and chemical laboratory							
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	knows in the basic scope the current state of knowledge on cell and tissue cultures					K_W01 K_W02 K_W03 K_W06	1 2 1 2

	W2	knows the construction, basic equipment and principles of operation (including health and safety regulations) of the plant and animal culture laboratory	K_W07 K_W08 K_W11	2 2 2
Umiejętności (absolwent potrafi) /Skills: (the graduate is able to)	U1	is able to work sterile in a chamber with vertical laminar airflow of the 2nd class of biological safety, has the ability to use basic (and some advanced) techniques of in vitro culture	K_U07 K_U10 K_U12 K_U22	1 1 1 2
	U2	knows how to use optical devices to observe cells, tissues and organs in vitro: a fluorescent stereoscopic microscope and an inverted microscope image analyzer with a fluorescent attachment	K_U06 K_U12 K_U15	2 1 1
Kompetencje (absolwent jest gotów do) /Competences: (The graduate is ready to)	K1	understands the need to constantly deepen the knowledge of in vitro cultures, important for the development of modern plant biotechnology, and has the ability to search from various sources of information expanding this knowledge, the ability to organize and present them	K_K01 K_K02 K_K03 K_K07	1 1 1 1
Treści programowe zapewniające uzyskanie efektów uczenia się: /Program contents ensuring the achievement of the learning outcomes:		The course covers knowledge and skills in the field of modern plant and animal biotechnology. The lecture part is intended to familiarize themselves with the theoretical foundations of in vitro culture, while in the exercise part, students acquire the ability to use the most important techniques of plant and animal cultures by practicing specific experiments. Students work in chambers with vertical laminar airflow that meet the requirements of class II biosafety (Biohazard)		
Sposób weryfikacji efektów uczenia się/ Methods of the verification of the learning outcomes:		colloquia, reports, written exam		
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:		personal evaluation sheet of the student and attachments: written report / multimedia presentation, the content of the issues / questions and the answers provided as part of the tutorial tests and the written exam, the possibility of using distance learning if necessary		
Elementy i wagi mające wpływ na ocenę końcową/Elements and weights influencing the final grade:		1- evaluation of the student's activity during the discussion, 2 - evaluation of colloquiums and tests of acquired skills, 3 - evaluation of the analysis of a defined problem / project, 4 - evaluation of the written exam. Weight of the final grade elements: 1 - 10%, 2 - 30%, 3 - 20%, 4 - 40%. The condition for completing the course is obtaining a minimum of 51 points out of 100 possible for each of the elements		
Miejsce realizacji zajęć/ Teaching place:		classroom, in vitro culture laboratory		
Biotechnologia roślin pod redakcją naukową Stefana Malepszego, Wydawnictwo Naukowe PWN, Warszawa 2009; <i>In vitro</i> embryogenesis in plants - ed. T. A. Thorpe. Kluwer Academic Publisher, Dordrecht. Printed in the Netherlands 1995; Stokłosowa S.: Hodowle komórek i tkanek, PWN, Warszawa 2004; Butler M.: Animal Cell Culture & Technology, BIOS, USA, 2004; Alberts B.: Podstawy biologii komórki. PWN, Warszawa, 2005 Clynes M.: Animal Cell Culture techniques, Springer Lab Manual, Berlin, 1998. Supplementary literature: the latest scientific publications from specialist journals and patents in the field of in vitro cultures (including items from KGHBR and KFiT)				
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:	150 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:	2.6 ECTS