

Nazwa zajęć/ <i>Course title:</i>	<b>Biologia oddziaływań roślina-mikroorganizm</b>	ECTS	<b>2</b>
Nazwa zajęć w j. angielskim/ <i>Course title in English:</i>	<b>Biology of plant-microbe interactions</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> 1	
Typ studiów/ <i>Form of studies:</i>	<input checked="" type="checkbox"/> intramural <input type="checkbox"/> extramural	Status zajęć/ <i>Course status</i>	<input type="checkbox"/> podstawowe/ <i>Basic</i> <input checked="" type="checkbox"/> kierunkowe/ <i>major</i> <input type="checkbox"/> obowiązkowe/ <i>mandatory</i> <input checked="" type="checkbox"/> do wyboru/ <i>elective</i>
		Semestr/ <i>Semester:</i> 5	<input checked="" type="checkbox"/> semestr zimowy/ <i>winter semester</i> <input type="checkbox"/> semestr letni/ <i>summer semester</i>
Rok akademicki/ <i>Academic year:</i>		<b>2022/2023</b>	Numer katalogowy/ <i>Catalogue number:</i> <b>BBT_BTa-1S-5Z-42_7</b>

Koordynator zajęć/ <i>Course coordinator:</i>	<b>Dr. Mirosław Sobczak</b>		
Prowadzący zajęcia/ <i>Teachers responsible for the course:</i>	Dr. hab. Wojciech Borucki (prof. SGGW), Dr. hab. Katarzyna Otulak-Koziół, Dr. Edmund Koziół, Dr. hab. Marzena Sujkowska-Rybkowska, Dr. Wojciech Kurek, Dr. Mirosław Sobczak		
Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i>	<p><b>Aim:</b> to provide basic knowledge concerning structural, functional and molecular responses of plants during interactions with parasitic and symbiotic microorganisms.</p> <p><b>A series of monographic lectures covering following topics:</b> description of structural, functional and molecular responses of plants to infection with following microorganisms: Uredinales fungi (mutual recognition, infection process, signals exchange between plant and pathogen, plant invasion, susceptible and resistant host responses); root parasitic nematodes (life cycle, modes of parasitism, induction and development of feeding sites, types and organisation of feeding sites, ultrastructure and anatomy of defence responses to parasitic nematodes); viroids, viruses and phytoplasmas (cytopathological changes induced in plants upon their infection, strategies of multiplication, replication and propagation, genome organisation, life cycles of RNA and DNA viruses, transmission by aphids and nematodes); plant interactions with symbiotic nitrogen-fixing bacteria (<i>Rhizobium</i> sp.) (characteristics of rhizobia as symbionts, characteristics of <i>com</i>, <i>nod</i> and <i>hcn</i> <i>nod</i> genes and their roles in symbiosis, involvement of plant flavonoids in activation of symbiosis-related genes, biological role of nod factors, their perception and signal transduction, initiation of root nodule development, structure and types of root nodules); mycorrhiza (structural features of symbiosis, types of interaction, developmental stages); other diazotrophic symbioses (<i>Frankia</i> and other nitrogen fixing bacteria and cyanobacteria); identification of biotic stress markers and role of resistance genes in defence responses of plants; implementation of molecular biology methods to obtain plants with artificial resistance to pathogens.</p>		
Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i>	a) lecture; number of hours 30;		
Metody dydaktyczne/ <i>Teaching methods:</i>	Monographic lectures based on multimedia presentations.		
Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i>	Basic botany.		
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>
Wiedza (absolwent zna i rozumie) <i>/Knowledge:</i> (the graduate knows and understands)	W1	mechanisms of structural and functional responses of plants to infection with symbiotic and pathogenic microorganisms	2; 1; 2; 2
	W2	roles played by symbiotic interactions in environment	2; 2
	W3	structural and cytological basis on plant defence mechanism to different pathogens	2; 2
Umiejętności (absolwent potrafi) <i>/Skills:</i> (the graduate is able to)	U1	select suitable sources of information and prepare properly-documented research report concerning structure and functions of plant responses in symbiotic and pathogenic interactions	1; 2; 1; 2;

			K_U19; K_U20; K_U21; K_U22	1; 1; 2; 2
Kompetencje (absolwent jest gotów do) /Competences: (The graduate is ready to)	K1	organize own and team work and take the responsibility for effects of these activities	K_U20; K_K01; K_K02	1; 2; 1;
Treści programowe zapewniające uzyskanie efektów uczenia się: /Program contents ensuring the achievement of the learning outcomes:	Description of structural, functional and molecular responses of susceptible and resistant host plants to infection with fungi (Uredinales), plant parasitic nematodes, viroids, viruses and phytoplasmas. Description of structural, functional and molecular responses of plants in interactions with symbiotic nitrogen-fixing bacteria (Rhizobium sp.), mycorrhiza and other diazotrophic symbioses (Frankia and cyanobacteria). Methods of obtaining plants with artificial resistance to pathogens.			
Sposób weryfikacji efektów uczenia się/ Methods of the verification of the learning outcomes:	W, U, K - self-prepared essay on selected topic concerning different issues of plant-microbe interactions.			
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:	All student's reports will be stored in the Department of Botany according to regulations acting in the Warsaw University of Life Sciences-SGGW			
Elementy i wagi mające wpływ na ocenę końcową/Elements and weights influencing the final grade:	Evaluation of essay - 100%. Final note is expressed according to evaluation scale acting in WULS-SGGW: 2.0 (below 50%; failed) -3.0 (passed; 50-60%) -3.5 (passed; 60-70%) -4.0 (passed; 70-80%) -4.5 (passed; 80-90%) -5.0 (passed; 90-100%).			
Miejsce realizacji zajęć/ Teaching place:	Seminar room of the Department of Botany, Building 37, room 2/99.			
Literatura/Literature:	<ol style="list-style-type: none"> <li>1. Lack A.J., Evans D.E. (2001 or newer) "Instant Notes in Plant Biology", BIOS Scientific.</li> <li>2. Agrios G.A. (1997 or newer) "Plant Pathology", Academic Press.</li> <li>3. Bresinsky A., Körner C., Kadereit J.W., Neuhaus G., Sonnewald U. "Strasburger's Plant Sciences", Springer.</li> <li>4. WWW pages and "open access" publications recommended by a teacher.1</li> </ol>			
UWAGI/ANNOTATIONS: None				

\*) 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:	60h
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:	1.0 ECTS