

Nazwa zajęć/ <i>Course title:</i>	Oporność roślin na szkodliwe stawonogi – wczoraj, dziś, jutro	ECTS	1
Nazwa zajęć w j. angielskim/ <i>Course title in English:</i>	Plant resistance to harmful arthropods - yesterday, today, tomorrow		
Zajęcia dla kierunku studiów/ <i>Degree program name:</i>	BIOTECHNOLOGY		

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> <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> 6	semestr zimowy/ <i>winter semester</i> <input checked="" type="checkbox"/> semestr letni/ <i>summer semester</i>
Rok akademicki/ <i>Academic year:</i> 2022/2023		Numer katalogowy/ <i>Catalogue number:</i>	BBT_BTa-1S-6L-47_9

Koordynator zajęć/ <i>Course coordinator:</i>	Prof. dr hab. Małgorzata Kielkiewicz-Szaniawska		
Prowadzący zajęcia/ <i>Teachers responsible for the course:</i>	Prof. dr hab. Małgorzata Kielkiewicz-Szaniawska; And employees of the Department of Plant Protection, Institute of Horticultural Sciences, WULS-SGGW		
Założenia, cele i opis zajęć/ <i>Aims, objectives and description of the course:</i>	Teaching the phenomenon of plant resistance to herbivorous invertebrates (e.g. pests) and its classification (mechanisms/ categories/ types); Extending the knowledge related to factors determining constitutive plant resistance to pests; Discussing the conditions for induced plant resistance, including different signaling pathways, the involvement of effectors and elicitors, as well as the priming phenomenon; Indicating the phenomenon of indirect plant resistance and the conditions necessary for it to emerge, as well as presenting the effectiveness of this phenomenon in the reduction of pest population density; Indicating the sources of plant pest resistance and the possibilities of using transgenic plants; Discussing the importance of plant pest resistance in integrated crop protection based on case studies.		
Formy dydaktyczne, liczba godzin/ <i>Teaching forms, number of hours:</i>	a) lectures; number of hours - 10 b) laboratory classes; number of hours - 5		
Metody dydaktyczne/ <i>Teaching methods:</i>	Lectures – multimedia presentations Laboratory classes – observation of the development and distribution of chosen insect/ mite species on a variety of plant species/ cultivars; identification of plant injuries caused by pest feeding; Discussion of results and preparation of individual reports		
Wymagania formalne i założenia wstępne/ <i>Formal requirements and prerequisites</i>	Basic knowledge on invertebrate animals and plant biochemistry		
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	01 – knows and understands the mechanisms of plant resistance against invertebrate herbivores 02 - knows and understands the methods and technics used to assess plant resistance against pests	K_W09 K-W10 K-W13 2
Umiejętności (absolwent potrafi) / <i>Skills: (the graduate is able to)</i>	U1	03 – is able to choose the proper method to assess plant resistance against a pest 04 – is able to collect, analyze and explain the results, as well as use internet and library databases to interpret them	K_U11 K_U21 K_U22 1
Kompetencje (absolwent jest gotów do) / <i>Competences: (The graduate is ready to)</i>	K1	05 – is able to prepare and use new methods/ technologies to increase the quality of crop production 06 – is able to work individually and in a team 07 – is aware of the responsibility for the quality of crop production and the natural and agricultural environments	K_K01 K_K02 K_K04 2
Treści programowe zapewniające uzyskanie efektów uczenia się: / <i>Program contents ensuring the achievement of the learning outcomes:</i>	The lectures will focus on: The current vs the historical definitions of plant resistance against pests – categories vs types of resistance; Mechanisms of constitutive resistance – antixenosis, anibiosis, tolerance; Induced resistance and the conditions necessary for it to emerge – signaling pathways, priming phenomenon, effectors and elicitors; Indirect resistance – definitions, the necessary conditions for it to emerge and its effectiveness in decreasing pest population density; Sources of plant resistance against pests; The relevance of plant resistance against pests (constitutive, induced, indirect) in integrated pest management systems; Practical laboratory classes: Practical assessment of constitutive and induced pest resistance in various plant species.		

Sposób weryfikacji efektów uczenia się/ <i>Methods of the verification of the learning outcomes:</i>	Effect 01-06 – the student’s work on an indicated subject and their activity in discussions on an indicated subject during practical classes Effect 01-07 – the final written test ending the course of lectures
Szczegóły dotyczące sposobów weryfikacji i form dokumentacji osiągniętych efektów uczenia się <i>/Details on the verification methods and of the ways of documenting the learning outcomes:</i>	A grade for the final written test ending the course of lectures, a mark for a written report/presentation on a defined issue given during practical classes and a grade for the student’s activity
Elementy i wagi mające wpływ na ocenę końcową/ <i>Elements and weights influencing the final grade:</i>	Elements influencing the final grade: 1) a grade for the final written test 2) a grade for the report /presentation on an indicated subject 3) a grade for the student’s activity during practical classes The student can receive 100 points for each of the final grade components. The weight of each of the elements: 1) – 30%; 2) - 50%; 3) – 15%; 4) – 5%. To pass the student must receive at least 51% of the points for components 1 and 2. The final mark is the sum of points received for each of the components (taking into consideration their individual weight). To pass the student must receive at least 51% of the total sum of points of all the components together.
Miejsce realizacji zajęć/ <i>Teaching place:</i>	Lecture room; Laboratory
Literatura/Literature: 1. Kozłowska M., Konieczny G. 2003. Biologia odporności roślin na patogeny i szkodniki; 2. Smith M.C. 2005. Plant Resistance to Arthropods. Molecular and Conventional Approaches. Springer. The Netherlands; 3. Schaller A. 2008. Induced Plant Resistance to Herbivory; 4. Stenberg J.A., Muola A. How should plant resistance to herbivores be measured?. Front. Plant Sci. 2017; 8: 863; 5. Mitchell C, Brennan RM, Graham J, Karley AJ. 2016. Plant Defense against Herbivorous Pests: Exploiting Resistance and Tolerance Traits for Sustainable Crop Protection. Front Plant Sci. 29;7:1132. doi: 10.3389/fpls.2016.01132; 6. Stout M. 2013. Reevaluating the conceptual framework for applied research on host-plant resistance. Insect Sci. 20(3):263-72. doi: 10.1111/1744-7917.12011	
UWAGI/ANNOTATIONS To calculate the final grade below scale will be used: 100-91% - 5.0; 90-81% - 4.5; 80-71% - 4.0; 70-61% - 3.5; 60-51% - 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>	30 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>	0.6 ECTS