SZKOŁA GŁÓWNA GOSPODARSTWA WIEJSKIEGO

Biology of plant-microbe interactions

Educational subject description sheet

Basic information

Field of study Biotechnology	**Didactic cycle** 2024/25
Speciality -	**Subject code** BBTBTjS_D.310K.01616.24
Organizational unit Faculty of Biology and Biotechnology	**Lecture languages** english
Study level first cycle (engineering degree)	**Mandatory** Elective subjects
Study form full-time studies	**Block** Major subjects
Education profile General academic	**Disciplines** Biological sciences

Coordinator	Wojciech Borucki
Teacher	Wojciech Borucki, Katarzyna Otulak-Kozieł, Edmund Kozieł, Marzena Sujkowska-Rybkowska, Wojciech Kurek, Mirosław Sobczak

Period	**Examination**	**Number of ECTS points**
Semester 5	Pass with grade **Activities and hours** Lecture: 30	2

Goals

Code	Goal
C1	to provide basic knowledge concerning structural, functional and molecular responses of plants during interactions with parasitic and symbiotic microorganisms

Entry requirements

Basic botany

Subject's learning outcomes

Code	Outcomes in terms of	Effects	Examination methods
Knowledge – Student knows and understands:			
W1	the mechanisms of structural and functional responses of plants to infection with symbiotic and pathogenic microorganisms	BTj_K3_W06, BTj_K3_W08, BTj_K3_W09, BTj_K3_W10	Essay
W2	the roles played by symbiotic interactions in environment	BTj_K3_W09, BTj_K3_W10	Essay
W3	the structural and cytological basis on plant defence mechanism to different pathogens	BTj_K3_W09, BTj_K3_W10	Essay
Skills – Student can:			
U1	select suitable sources of information and prepare properly-documented research report concerning structure and functions of plant responses in symbiotic and pathogenic interactions	BTj_K3_U03, BTj_K3_U04_inz, BTj_K3_U15_inz, BTj_K3_U18, BTj_K3_U19, BTj_K3_U20, BTj_K3_U21, BTj_K3_U22	Essay
Social competences – Student is ready to:			
K1	organize own and team work and take the responsibility for effects of these activities	BTj_K3_K01, BTj_K3_K02	Essay

Study content

No.	Course content	Subject's learning outcomes	Activities

1.	Lectures covering following topics: 1. description of structural, functional and molecular responses of plants to infection with: 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 (Rhizobium sp.) (characteristics of rhizobia as symbionts, characteristics of com, nod and hsn nod 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 (Frankia and other nitrogen fixing bacteria and cyanobacteria); 2. 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.	W1, W2, W3, U1, K1	Lecture

Course advanced

Activities	Methods of conducting classes
Lecture	Lecture

Activities	Examination method	Percentage
Lecture	Essay	100%

Activities	Credit conditions
Lecture	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%).

Literature

Obligatory

1. Lack A.J., Evans D.E. (2001 or newer) “Instant Notes in Plant Biology”, BIOS Scientific.
2. Agrios G.A. (1997 or newer) “Plant Pathology”, Academic Press.
3. Bresinsky A., Körner C., Kadereit J.W., Neuhaus G., Sonnewald U. “Strasburger’s Plant Sciences”, Springer.

Optional

1. WWW pages and “open access” publications recommended by the teachers

Calculation of ECTS points

Activity form	**Activity hours***
Lecture	30
Conducting literature research	20
Student workload	**Hours** 50
Number of ECTS points	**ECTS** 2

* hour means 45 minutes

Effects

Code	Content
BTj_K3_K01	The graduate is ready to proper storage of data, updating and extending knowledge on topics related to biotechnology and the related sciences;
BTj_K3_K02	The graduate is ready to development and application of one’s skills in practice (including communication, teamwork), which enable effective lifelong learning with respect to biological sciences;
BTj_K3_U03	The graduate can provide and explain specific examples and apply proper experimental methods associated with the explanation of principles related to gene expression;
BTj_K3_U04_inz	The graduate can present and discuss key principles of scientific interdisciplinary bases, as well as a multidisciplinary approach to the processes and mechanisms of life;
BTj_K3_U15_inz	The graduate can design modification of the features of a biological organism and the conditions of a process associated with the multiplication of biological material in accordance with the adopted assumptions, select devices and unit operations related to the extraction, purification and preservation of a bioproduct;
BTj_K3_U18	The graduate can coherently communicate within the scope of the topics pertaining to biotechnology both with specialists and with outside receivers;
BTj_K3_U19	The graduate can use a foreign language in speech and in writing within the scope of fields of science and scientific disciplines proper for the field of biotechnology, according to the requirements defined for level B2 of the Common European Framework of Reference for Languages;
BTj_K3_U20	The graduate can plan and organise work, both individual and in a team
BTj_K3_U21	The graduate can coping with understanding, planning and analysing; being able to interpret and report biological data acquired while working individually and in a group;
BTj_K3_U22	The graduate can find and assess information from various sources, including from original research, and present in a well organised manner (e.g. essays, reports and laboratory reports);
BTj_K3_W06	The graduate knows and understands the functions of various cells (prokaryotic and eukaryotic), being able to critically explain, how their properties are related to varying biological functions, knowing how they can be tested experimentally
BTj_K3_W08	The graduate knows and understands the features of cellular metabolism and its control, including the knowledge of certain experimental techniques;
BTj_K3_W09	The graduate knows and understands living organisms and their place in the natural environment, and how they can be used for the good of humanity;
BTj_K3_W10	The graduate knows and understands terms, principles and theories related to processes and mechanisms which have shaped the world of nature, knowing how they can be used efficiently;