

Course name: Biological and Biotechnical Methods of Plant Protection

ECTS	5.0
Course status	<i>facultative</i>
Course final assessment /evaluation of outcomes	<i>the grade point average of the written report and oral presentation</i>
Prerequisite	-

The main field of study:

Agriculture and Horticulture, Biology and Biotechnology (Erasmus+)

Educational profile	<i>general academic</i>
Code of studies and education level	<i>bachelor/engineer (SI) or master of science (SM)</i>
Semester of Studies	<i>winter or summer</i>
Language of instruction	<i>English</i>

Course offered by:

Name of faculty offering the course	Faculty of Biotechnology and Horticulture
Name of the department offering the course	Department of Botany, Plant Physiology and Plant Protection
Course coordinator	dr hab. Maria Pobożniak, Prof. URK dr hab. Jacek Nawrocki

Learning outcomes:

Symbol of outcome	Description of the learning outcome	Reference to the main field of study outcomes	Area symbol*
KNOWLEDGE – student knows and understands:			
BMOR_W1	the significance and development of biological methods of plant protection, the basic definitions in the field of biological and biotechnical methods of plant protection, the use of biological and biotechnical products in ecological (organic) vegetable and fruit production	EPB2_W03	RP
BMOR_W2	biological agents: microorganisms (viruses, bacteria, fungi, fungus-like, and actinomycetes, nematodes), macro-organisms (insects and mites), and biotechnical substances of microbial metabolites, plant, animal, and mineral-derived compounds, which are used in biological control	EPB2_W03	RP
BMOR_W3	GM and GE crops produced to reduce the use of chemicals in the form of fertilizers, pesticides, and herbicides and to get tolerance to biotic and abiotic stresses	EPB2_W03	RP
BMOR_W4	semiochemicals in biological and ecological control: hormone analogs, chitin synthesis inhibitors, and pheromones, nano biopesticides as a new opportunity in biological control	EPB2_W01	RP
SKILLS – Students can:			
BMOR_U1	assess the effectiveness of biopesticides in control crops against important pathogens in laboratory conditions	EPB2_U05	RP
BMOR_U2	determine the effectiveness of selected biologically active compounds on major plant pathogens in greenhouse crops	EPB2_U01, EPB2_U05	RP
BMOR_U3	identify and application of macro-organisms used in biological control in greenhouse crops	EPB2_U01	RP
BMOR_U4	assess the effect of microorganisms on selected insect groups	EPB2_U05, EPB2_U11	RP
BMOR_U5	obtain GM and GE crops for reduction of the use of chemicals (fertilizers, pesticides, herbicides, and others)	EPB2_U05	RP

SOCIAL COMPETENCIES – student is ready to:			
BMOR_K1	work in a group on a specific task	EPB2_K02	RP
BMOR_K2	appreciate advantages resulting from the use of biological and biotechnical products in pest and disease control	EPB2_K01	RP

Teaching contents

Lectures		25 hours
Topics	Basics of biological pest control. Possibilities of using natural enemies of pests and pathogens to protect horticultural, agricultural, and forest crops. The importance and potential for reproducing major antagonists of important pests and diseases: baculoviruses, bacteria, fungi and fungal-like organisms, actinomycetes, nematodes, predatory insects, mites, and parasitoids. Semiochemicals in biological control: hormone analogs, chitin synthesis inhibitors, and pheromones, nano biopesticides as a new opportunity in biological control. Genetically modified (GM) and genome-edited (GE) crops produced to reduce the use of chemicals in the form of fertilizers, pesticides, and herbicides and gain tolerance to environmental stresses.	
Accomplished learning outcomes		<i>BMOR_W1- W4</i>
Means of verification, rules, and criteria of assessment		<i>the written test - essay or oral presentation on a given subject and attendance and activity during lectures are assessed oral presentation (50 %)</i>
Classes and seminars: 20 hours		
Topics	Pheromone traps and sticky boards used to monitor and determine the economic threshold and adjust the doses of introduced predatory insects and parasitoids. Evaluation of the effectiveness of the use of bioagents (predators and parasitoids) as well as microorganisms and preparations of microbial origin (bacteria, baculoviruses, entomopathogenic fungi, and nematodes) in the control of plant creepers. Evaluation of the effectiveness of biopesticides in the protection of crops against pathogens in laboratory conditions. Evaluation of the effectiveness of selected biologically active compounds on plant pathogens in greenhouse crops. Methodology of GM and GE crops obtaining for reduction the use of chemicals and getting tolerance to environmental stresses.	
Accomplished learning outcomes		<i>BMOR_U1-U5</i>
Means of verification, rules, and criteria of assessment		<i>evaluation of the preparedness for classes; activities, written report on laboratory work (50%)</i>

References:

Basic	<p><i>Opender Koul, G. S. Dhaliwal. 2001. Microbial Biopesticides. 1st Edition. CRC Press.</i></p> <p><i>Pal, K. K.. Spadden Gardener B. Mc. 2006. Biological Control of Plant Pathogens. The Plant Health InstructorDOI:10.1094/PHI-A-006-1117-02.</i></p> <p><i>Hajek A.E., Eilenberg J. 2018. Natural Enemies. 2nd Edition. Cambridge University Press.</i></p> <p><i>Heikki M. T. Hokkanen, Yulin Gao, 2021. Progress in Biological Control.</i></p> <p><i>Mason P. 2022. Biological Control: Global Impacts, Challenges and Future Directions of Pest Management</i></p>
Supplementary	<p><i>BioControl - Journal of the International Organization for Biological Control (IOBC). Springer</i></p> <p>https://link.springer.com/journal/10526/updates/17231570</p>

Structure of learning outcomes

Area of academic study: R – Agricultural, forestry and veterinary sciences	3.0 ECTS **
Area of academic study: P – biological sciences	2.0 ECTS

Structure of student activity

Contact hours	50	hrs.	2.0	ECTS**
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Including:	lectures	25	hrs.	
	classes and seminars	20	hrs.	
	consultations	3	hrs.	
	participation in research		hrs.	
	obligatory traineeships		hrs.	
	participation in examination	2	hrs.	
	e-learning		hrs.	ECTS**
	student own work	75	hrs.	3.0 ECTS**

*Areas of academic study in the fields of H- humanities; S - social studies; P – biological sciences; T – technological sciences; M- medical, sport, and health sciences; R – Agricultural, forestry, and veterinary sciences; A – the arts

** stated with an accuracy to 0.1ECTS, where 1 ECTS = 25 - 30 hours of classes