

Course code: .....

Plan position: .....

### A. INFORMATION ABOUT THE COURSE

#### B. Basic information

Name of course	<b>Biotechnology of microorganisms with elements of plant pathology</b>
Field of studies	International Studies
Level of studies	First cycle
Profile of studies	Academic
Form of studies	Full time
Specialty	
Unit responsible for the field of studies	Faculty of Agriculture and Biotechnology/Laboratory of Molecular Phytopathology, Mycology and Entomology
Name and academic degree of teacher(s)	Aleksander Łukanowski PhD, Anna Baturo-Cieśniewska DSc, Małgorzata Jeske PhD, Grzegorz Lemańczyk DSc, Dariusz Pańka DSc
Introductory courses	none
Introductory requirements	none

#### C. Semester/week schedule of classes

Semester	Lectures (W)	Auditorium classes (Ć)	Laboratory classes (L)	Project classes (P)	Seminar (S)	Field classes (T)	Number of ECTS points
Summer/Winter	30						6

### 2. LEARNING OUTCOME

No.	Learning outcomes description	The reference to the learning outcomes of specific field of study	The reference to the learning outcomes for the area
<b>KNOWLEDGE</b>			
W1	Understands the relationship between the achievements of biotechnology and the possibilities of their use in industry, agriculture and food analysis.	K_W17	P6S_WK
W2	Students get knowledge about nature and dynamics of the most dangerous plant diseases, casual agents, their development, pathogenicity, prevention and control	K_W06	P6S_WG
<b>SKILLS</b>			
U1	Student is able to operate basic equipment used in mycological and biotechnological laboratory	K_U13	P6S_UW
U2	Student identifies pathogens using standard and molecular methods of diagnostics; estimates harmfulness of plant diseases and protects crops against pathogens	K_U04	P6S_UW
<b>SOCIAL COMPETENCES</b>			

K1	Student is aware of social, professional and ethical responsibility for the use of biotechnology and plant protection products in agricultural production, food production and planning the plant protection strategies safe to the consumers and the environment.	K_K05	P6S_KR
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### 3. TEACHING METHODS

#### A. Traditional methods used \*\*\*

Lectures with demonstration
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#### B. Distance learning methods used \*\*\*

<p><b>Synchronous method</b> (classes conducted in a way that ensures direct interaction between the student and the teacher in real time, enabling immediate flow of information, the method can be used only if it is provided for in the study plan for a given cycle of education): e.g. remote lecture in the form of videoconference, remote discussion, etc.</p> <p><b>Asynchronous method</b> used as an auxiliary (a method that does not ensure direct interaction between the student and the teacher in real time, used only as an auxiliary / complementary method): e.g. online educational videos, online multimedia presentations, etc.</p>
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### 4. METHODS OF EXAMINATION

Colloquium
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### 5. SCOPE

Lectures	<p>Morphology and reproduction of fungi and their importance for industry and plant pathology. Mycotoxins and mycotoxin-producing fungi. Principles of isolation of fungi from plant material and basic of microscopic and molecular identification.</p> <p>Microorganisms in biotechnology. Polymerase Chain Reaction – theory, technical aspects and application in plant pathology. Real time-PCR – theory and technical aspects. PCR assay optimization.</p> <p>Significance of plant diseases, pathogenic microorganisms, mechanisms of plant defense responses, plant disease epidemiology, methods of control of plant diseases with special emphasis of biological methods of plant protection, endophytes as a biological control agents, influence of fungicides on humans and environment.</p>
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### 6. METHODS OF VERIFICATION OF LEARNING OUTCOMES

LEARNING OUTCOME	Colloquium
W1	x
W2	x
U1	x
U2	x
K1	x

## 7. LITERATURE

Basic literature	<p>Green M.R. and Sambrook J., 2020. Polymerase Chain Reaction - Cold Spring Harbor Laboratory Press.</p> <p>Satyanarayana T. et al., 2019. Advancing Frontiers in Mycology &amp; Mycotechnology: Basic and Applied Aspects of Fungi; Springer Nature Singapore Pte Ltd.: Singapore, 2019 (selected fragments).</p> <p>Senanayake I. et al. 2020. Morphological approaches in studying fungi: collection, examination, isolation, sporulation and preservation. Mycosphere, 11, 2678–2754.</p> <p>Webster J. and Weber R., 2007. Introduction to Fungi. Cambridge University Press; 3<sup>rd</sup> ed. (selected fragments).</p> <p>Agrios G.N., 2005. Plant pathology. Academic Press, 5th ed.</p>
Supplementary literature	<p>Scientific papers as: Awuchi C.G. et al., 2021. Mycotoxins affecting animals, foods, humans, and plants: Types, occurrence, toxicities, action mechanisms, prevention, and detoxification strategies-A revisit. Foods, 10, 1279; Nan Met al., 2022. Contamination, Detection and Control of Mycotoxins in Fruits and Vegetables. Toxins 2022, 14, 309.</p> <p>PROTOCOLS &amp; APPLICATIONS GUIDE - Promega <a href="https://worldwide.promega.com/~media/files/resources/paguide/letter/chap1.pdf?la=en">https://worldwide.promega.com/~media/files/resources/paguide/letter/chap1.pdf?la=en</a></p> <p>APSnet Education Center: <a href="http://www.apsnet.org/edcenter/Pages/InformationforStudents.aspx">www.apsnet.org/edcenter/Pages/InformationforStudents.aspx</a></p>

## 8. TOTAL STUDENT WORKLOAD REQUIRED TO ACHIEVE EXPECTED LEARNING OUTCOMES EXPRESSED IN TIME AND ECTS CREDITS

Student's activity		Student workload– number of hours
Classes conducted under a direct supervision of an academic teacher or other persons responsible for classes	Participation in classes indicated in point 1B	30
	Supervision hours	4
Student's own work	Preparation for classes	35
	Reading assignments	46
	Other (preparation for exams, tests, carrying out a project etc)	35
Total student workload		150
Number of ECTS points		6