



**COURSE SYLLABUS**  
**BIOPHYSICS AND MATHEMATICS**

**Degree of higher education - Bachelor**

**Specialization 202 Plant protection and quarantine**

**Educational programme** « Plant protection and quarantine »

**Academic year** 2023/2024, **semester** 2

**Form of study** full-time (full-time, part-time)

**Number of ECTS credits** 3

**Language of instruction** English (Ukrainian, English, German)

**Lecturer of the course**

**candidate of physical and mathematical sciences, associate professor Oksana Godlevska**

**Contact information of the lecturer (e-mail)**

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**Course page on eLearn**

<https://elearn.nubip.edu.ua/course/view.php?id=2511>

**COURSE DESCRIPTION**

*(up to 1000 printed characters)*

**The main objective** of the course “Biophysics” is to expose principal laws and theses of physics which make it possible to study general regularities of natural phenomena; to apply the principles and methods of the physical sciences to biological problems; to consider the biophysical problems which are concerned with the viability of agricultural animals and their interaction with the environment; to elucidate possible application of physical instrumentation to plant protection.

The main requirements to the student after studying by him the course “Biophysics” are the following:

**The student must know**

the main physical quantities and units, principal laws and theses of general physics, theory and practice of measurement errors;

general physical processes and phenomena which take place in the living organism;

the effects of external physical factors on agricultural plant and their interaction with the environment;

possibility of the application of physical instrumentation to plant protection.

**The student must be able**

to process experimental data and estimate measurement errors;

to explain physical principles and mechanisms of function of living organism;

to use modern physical methods and devices in plant protection practice.

Final control is carried out in the form of tests for each of the modules and an exam.

### **Acquisition of competencies**

The study of the academic discipline "Biophysics" contributes to the fact that, according to this standard, the student is able to acquire:

#### **Integral competencies (IC):**

Possess knowledge of the fundamental sections of higher mathematics, biophysics, chemistry (analytical, organic, inorganic, physical and colloidal), botany and agrozoology to the extent necessary for understanding the processes of the specialty plant protection and quarantine.

#### **general competencies (GC):**

GC1. Ability to abstract thinking, analysis and synthesis.

GC2. Ability to apply knowledge in practical situations.

GC3. Knowledge and understanding of the subject area and understanding of professional activity.

GC7. Ability to learn and master modern knowledge and search, processing and analysis of information from various sources.

#### **Program learning outcomes (PLO):**

PLO4. Possess knowledge of the fundamental sections of higher mathematics, biophysics, chemistry (analytical, organic, inorganic, physical and colloidal), botany and agrozoology to the extent necessary for understanding the processes of the specialty plant protection and quarantine.

## COURSE STRUCTURE

Names of content modules and topics	Number of hours											
	Full-time form							Part-time form				
	weeks	total	including					total	including			
			l	p	lab	individual	self		l	p	lab	individual
1	2	3	4	5	6	7	8	9	10	11	12	13
<b>Content module 1. Mechanics. Acoustics. Thermodynamics.</b>												
<b>Topic 1.</b> Mechanics. Kinematics, dynamics, statics. Elastic properties of bodies.	1-2	7	1		4		2					
<b>Topic 2.</b> Biomechanics	2-3	5	1		2		2					
<b>Topic 3.</b> Hydrodynamics.	3-4	7	1		2		4					
<b>Topic 4.</b> Molecular physics. Temperature and humidity of the environment	4-5	7	3		2		2					
<b>Topic 5.</b> Acoustics, bioacoustics.	5-7	7	1		4		2					
<b>Topic 6.</b> Thermodynamics of equilibrium and irreversible states and processes.	7-8	5	1		2		2					

<b>Together according to content module 1</b>	38		8		16		14					
<b>Content module 2. Electricity. Magnetism. Optics.</b>												
<b>Topic 1.</b> Electricity, bioelectricity.	9-10	10	2		4		4					
<b>Topic 2.</b> Magnetism, biomagnetism.	11-12	9	2		4		3					
<b>Topic 3.</b> Geometric, wave optics.	13-14	10	2		4		4					
<b>Topic 4.</b> Physiological optics and photobiology	15	5	1		2		2					
Together according to content module 2	34		7		14		13					
Total hours	72		15		30		27					
Course project (work) with _____			-	-	-		-	-	-			
Total hours												

### ASSESSMENT POLICY

<b><i>Policy regarding deadlines and resits:</i></b>	Assignments submitted after the deadline without valid reasons will be graded lower. Resitting of modules will be allowed with the permission from the lecturer and in the presence of valid reasons (e.g. medical reasons).
<b><i>Academic honesty policy:</i></b>	Cheating during tests and exams is strictly prohibited (including the use of mobile devices). Coursework and research papers must contain correct citations for all sources used.

<b>Attendance policy:</b>	Class attendance is mandatory. In case of objective reasons (such as illness or international internships), individual learning may be allowed (in online format by the approval of the dean of the faculty).
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### SCALE OF ASSESSMENT OF STUDENT KNOWLEDGE

Student rating, points	National grade based on exam results	
	exams	credits
90-100	excellent	passed
74-89	good	
60-73	satisfactory	
0-59	unsatisfactory	not passed

### Recommended sources of information

Posudin Yuriy. *Physics with Fundamentals of Biophysic.*- 2d edition.- Kyiv: Printline, 2014.- 209 p.

Physics\ V. Boyko, O. Godlevska, P.Iiin, M. Malyuta\ Methodical recommendations for the students, who attend the English-speaking lectures, printed NULE of Ukraine, Kyiv. 2021, p.52

Посудін Ю.І. *Лабораторний практикум з дисципліни «Фізика з основами біофізики» для студентів, що слухають лекції англійською мовою.* К.: 2010.-194 с. (для англomовних груп).  
Бойко В.В., Відьмаченко А.П., Залоїло І.А., Малюта М.В. *Фізика з основами кваліметрії: Навчальний посібник.* - К.: Видавництво «Ліра– К», 2018, – 564 с.

Практикум з біофізики : навчальний посібник для вищих навчальних закладів. Ч. І. Біомеханіка / В. В. Бойко, І. А. Залоїло, О. О. Годлевська. - К.: , 2021. - 572 с.

Практикум з біофізики : навчальний посібник для вищих навчальних закладів. Ч. ІІ. Біотермодинаміка. Біоелектрика та біомагнетизм. Фотобіологія. / В. В. Бойко, І. А. Залоїло, Ю.І. Посудін. - К.:, 2019. - 486 с.

Посудін Ю.І. *Фізика з основами біофізики.* Київ, Світ, 2003.-400 с.

Посудін Ю.І. *Лабораторний практикум з дисципліни "Фізика з основами біофізики": Навчальний посібник* - Київ, НУБіПУ, 2012.-105 с.