

to the Order of March 23, 2023 № 244

**NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF  
UKRAINE**

Department Entomology, integrated protection and quarantine of plants

Dean of Plant protection, Biotechnologies and Ecology Faculty

Prof. Kolomiets Y.u.V.  
Protocol №9 від 18.05, 2023

«APPROVED»

Head of Department of Entomology,  
Integrated pest management Head  
and quarantine  
Protocol №14 від 19.04.2023

Professor  
Dolya M.M

«CONSIDERED»

Garant of Educational Program, Bachelor level 202  
«Plant protection and Quarantine»

DSc, Associate Professor, Pikovskiy M.Yo.

**Program of the course  
General entomology**

Specialization 202 "Plant protection and Quarantine"

Educational program "Plant protection and Quarantine"

Faculty (Institute) Plant protection, Biotechnology and Ecology

Developers: PhD, Associated Professor Liudmyla Kava

(position, academic degree, academic title)

Kyiv – 2023 y.

## 1. Description of the course

### General entomology

(title)

Field of knowledge, specialization, educational program, educational degree		
Educational degree	<i>Bachelor's</i>	
Specialization	<i>202 Plant protection and Quarantine</i>	
Educational program	<i>Plant protection and Quarantine</i>	
Characteristics of the course		
Type	Compulsory	
Total number of hours	240	
Number of ECTS credits	8	
Number of content modules	4	
Course project (work) (if applicable)	30	
Form of assessment	<i>Exam</i>	
Indicators of the course for full-time and part-time forms of study		
	Full-time form of study	Part-time form of study
Course (year of study)	3	3
Semester	5,6	6
Lecture classes	60	8
Practical, seminar classes		
Laboratory classes	90	12
Self-study	60	94
Individual assignments		
Number of weekly classroom hours for the full-time form of study	4	

## 2. Purpose, objectives, and competencies of the course

Purpose:

- Explain the importance of insects as members of ecosystems.
- Describe the basic anatomy, morphology, taxonomy, development, life histories and key characteristics of different insect groups.
- Identify common orders and families of insects.
- Demonstrate the ability to properly collect and curate insects

Objectives: It is expected that at the end of this course, you should be able to:

- Explain which order an insect belongs to
- Describe something about an insect's structure and function
- Increase your insect appreciation and decrease your entomophobia (ento - insect, phobia - fear)
- Explain the importance of insects
- Describe basic insect structure and function
- Describe the basic classification of economically important insects

- Explain how insects affect humans
- Discuss and explain major events in arthropod and insect evolution and unique aspects of their biology that have contributed to their diversity.
- Classify and characterize insects with particular reference to vector diseases
- Describe insect ecology o Insect anatomy o Insect physiology o Insect environment and entomology
- Understand the classes of insecticides, their formulation and application
- Compare and contrast human and insect respiratory, endocrine, digestive, circulatory, and reproductive systems.

**Acquisition of competencies:**

*Integrated competency (IC):* The ability to solve complex specialized tasks and practical problems of professional activity in plant protection and quarantine and to apply theoretical knowledge and methods of phytosanitary monitoring, inspection, analysis, expertise, characterized by complexity and uncertainty of conditions

*General competencies (GC):*

GC 2. Ability to apply knowledge in practical situations.

GC 3. Knowledge and understanding of the subject area and understanding of professional activity.

GC 8. Ability to generate new ideas (creativity).

GC 11. Ability to make informed decisions.

*Program learning outcomes (PLO):*

PLO 8. To be able to coordinate, integrate and improve the organization production processes during plant protection measures.

PLO 9. Effectively schedule time to produce predictable results plant protection and quarantine activities.

PLO 16. Know the main historical stages of development of the subject area.

**3. Program and structure of the course for:**

- complete full-time (part-time) form of study;
- shortened full-time (part-time) form of study.

2	Number of hours													
	Full-time form							Part-time form						
	w e e k s	total	including					total	including					
l			p	lab	in d	sel f	l		p	lab	in d	sel f		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	
<b>Module 1. Formation of entomology as a science. External anatomy</b>														
Topic 1. Introduction. Subject main objectives of the subject "General			2		2									2

entomology"												
Topic 2. Importance of Insects. Evolution and Diversity			2		2		2				2	
Topic 3. External anatomy (exoskeleton). The Integument and Cuticular Structures			2		2		2		0,5		0,5	2
Topic 4. The Head. Antennae.			2		2		2		0,5		0,5	2
Topic 5. Mouthpart and modification.			2		2		2		0,5		0,5	2
Topic 6. Torax (legs, wings and locomotion)			2		4		2		0,5		0,5	4
Topic 7. Abdomen			2		4		2				0,5	4
Topic 8. Egg Structure The types of insect's eggs			2		4		2				0,5	4
Topic 9. The types of insect's larva			2		4		2					4
Topic 10. The types of insect's pupa			2		4		2					4
Total for content module 1	70		20		30		20		2		3	30
<b>Module 2. Internal Anatomy and Physiology</b>												
Topic 1 Respiratory System			2		2		2		0,5		0,5	2
Topic 2.. Circulatory System			2		2		2		0,5		0,5	2
Topic 3. <u>Digestive &amp; Excretory Systems</u>			2		2		2		0,5		0,5	2
Topic 4. <u>Reproductive System</u>			2		2		2		0,5		0,5	2
Topic 5. Nervous System			2		4		2				0,5	4
Topic 6. Endocrine System and hormone			2		2		2				0,5	4
Topic 7. Muscular system of insects and locomotion			2		2		2					4
Total for content module 2	44		14		16		14		2		3	20
<b>Module 3. Growth and Development and Behavior. Insects ecology</b>												
Topic 1. Embryogenesis			2		2		2		0,5		0,5	2
Topic 2. Morphogenesis			2		2		2		0,5		0,5	2
Topic 3. Survival Strategies			2		4		2		0,5		0,5	4
Topic 4. Insect Defenses			2		4		2		0,5		0,5	4
Topic 5. Population Dynamics			2		4		2				1	4
Total for content module 3	36		10		16		10		2		3	16
<b>Module 4. Systematics and Taxonomy</b>												
Topic 1. Introduction to Systematics The Arthropods and			2		4		2				0,5	4

Hexapods													
Topic 2. Entognatha			2		6		2		0,5		0,5		6
Topic 3. Apterygota			4		6		4		0,5		0,5		6
Topic 4. Pterygota. Hemimetabola			4		6		4		0,5		0,5		6
Topic 5. Pterygota. Holometabola			4		6		4		0,5		1		6
Total for content module 4	60		16		28		16		2	3			28
Total hours													
Course project (work) on	30												
(if included in the curriculum)			-		-		-		-		-		-
Total hours	240		60		90		60		8		12		94

#### 4. Seminar topics

№	Topic title	Number of hours
1		
2		
...		

#### 5. Practical class topics

№	Topic title	Number of hours

#### 6. Laboratory class topics

№	Theme	Amount of hours
1	Introduction. Subject main objectives of the subject "General entomology"	5
2	Importance of Insects	5
3	Evolution and Diversity	5
4	External anatomy (exoskeleton)	5
5	External anatomy. Head. Antennae. Mouthpart and modification.	5
6	Torax (legs, wings and locomotion) and Abdomen	15
7	Digestive & Excretory Systems	5
8	Circulatory System and Respiratory System	5
9	Reproductive System	5

10	Egg Structure	5
11	Embryogenesis	5
12	Morphogenesis	5
13	Introduction to Systematics. The Arthropods and Hexapods	6
14	Apterygota and Pterygota	8
15	Hemipteroids and Holometabola	6
16	Survival Strategies	5
17	Insect Defenses	5
18	Population Dynamics	5
	<b>Total amount</b>	<b>90</b>

## 7. Independent work topics

№	Topic title	Number of hours
1	Insect Societies: Termites	6
2	Insect Societies: Ants	6
3	Insect Societies: Bees	6
4	Insect Predation	6
5	Insect Parasitism	6
6	Medical Entomology	6
7	Ground-Dwelling Insects	6
8	Aquatic Insects	6
9	Pollination, Co-evolution, Mutualism	6
10	Defense and Mimicry	6
	Total hours	60

## 8. Samples of control questions, tests for assessing the level of knowledge acquisition by students.

1. Write the main characteristic Oder Diplura.
2. Write about characteristics non-insect hexapods (Protura, Diplura, Collembola)
3. Order Dictyoptera (Cockroaches and Mantids)
4. Order Phasmida (Leaf insects and Stick insects)
5. Order Plecoptera (Stone flies and Salmon flies)
6. Order Isoptera (Termites)
7. Order Zoraptera (Zorotypus)
8. Order Embioptera (Web-spinner)
9. Order Dermaptera (Earwigs)
10. Order Psocoptera (Book lice and Bark lice)

11. Order Mallophaga (Bird lice)
12. Order Anopleura (=Siphunculata) (Sucking lice)
13. Order Thysanoptera (Thrips)
14. Order Hemiptera (Bugs, Hoppers, Cicadas, White flies, Scale insects)
15. Order Grylloblattoidea (Grylloblatta)
16. Order Neuroptera (Ant-lions and lacewings)
17. Order Coleoptera (Beetles and Weevils)
18. Order Strepsiptera (stylopids)
19. Order Mecoptera (Scorpion flies)
20. Order Trichoptera (Caddis flies)
21. Order Lepidoptera (Butterflies and Moths)
22. Order Hymenoptera (Wasps, Bees, Ants, Sawflies)
23. Order Diptera (True flies, Mosquitoes, Sandflies, gnats)
24. Order Siphonaptera (Fleas)

#### Tests

1. After passing through a spiracle, air diffusing throughout a complex, branching network of:
  - A. tracheal trunk
  - B. tracheal tubes
  - C. taenidia
  - D. air sacs.
2. How much are basic components that form “mandibulate” mouthparts
  - A. five
  - B. four
  - C. three
  - D. six
3. How called organ that allows dissolved oxygen from the water to pass (by diffusion) into an organism's body. In insects, this organ are usually outgrowths of the tracheal system and are covered by a thin layer of cuticle that is permeable to both oxygen and carbon dioxide:
  - A. Biological Gills
  - B. Breathing Tubes
  - C. Air Bubbles
  - D. Plastrons
  - E. Hemoglobin
4. Which order from Apterygote insects have survived to the present time.
  - A. Archaeognatha,
  - B. Thysanura,
  - C. Monura.
5. How called the side of each segment, that is usually divided by a pleural suture into at least two sclerites:
  - A. pleuron
  - B. episternum
  - C. epimeron
6. Labium is subdivided into the following parts:
  - A. Postmentum and Prementum

- B. Cardio, Stipes, Galea and Lacinia
7. How called the leg, adapted for running:
- A. Cursorial
  - B. Raptorial
  - C. Fossorial
  - D. Saltatoria
8. The dorsal sclerite of of the abdomen called:
- A. tergum
  - B. sternum
  - C. pleural membrane
9. How called the egg-laying mechanism of females:
- A. ovipositor
  - B. valvifers
  - C. valvulae
  - D. aedeagus
10. Hemimetabola insects group have next developmental stages in the life cycle:
- A. egg,
  - B. larva,
  - C. pupa,
  - D. adult (imago).

### **9. Teaching methods.**

The following methods are used in teaching the discipline:

- verbal (lectures, practical discussions, surveys, explanations, educational discussions);
- visual (demonstration of available material and collections, presentations, illustrations);
- practical (exercises, experiments, practical works);
- non-traditional teaching methods (teacher as moderator, game design)
- independent (reading abstracts and thinking about problematic issues of lectures, solving tasks; visiting the library, working with various literature, taking notes, abstracts; discussing educational material with other students without the participation of the teacher; preparing reports, messages, essays, presentations, completing individual tasks) ;
- control

### **10. Forms of assessment**

1. Current control of knowledge
2. The form of the applicant's independent work is the study of special literature and the performance of individual tasks

**11. Distribution of grades received by students.** Evaluation of student knowledge is carried out on a 100-point scale and is converted to national grades according to Table 1 "Regulations and Examinations and Credits at NULES of Ukraine" (order of implementation dated 26.04.2023, protocol №10)



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

In order to determine the rating of a student (listener) in the discipline  $R_{dis}$  (up to 100 points), the rating from the exam  $R_{ex}$  (up to 30 points) is added to the rating of a student's academic work  $R_{aw}$  (up to 70 points):  $R_{dis} = R_{aw} + R_{ex}$ .

### 11. Educational and methodological support.

Educational and methodical support of the educational process includes: study plans, textbooks, study aids; individual educational and research tasks; control works; text and electronic versions of tests for current and final control, methodological materials for organizing independent work of applicants

1. Likar Ya. O., Pasichnyk L.P., Kava L.P., Statkevych O.I. Metodychni vказivky do navchalnoi praktyky z dytsypliny «Zahalna entomolohiia». K.: Vydavnytstvo NUBiP Ukrainy, 2022. (in ukr.)
1. Kava L.P., Yakovliev R.V., Likar Ya.O. Zahalna entomolohiia: robochy zoshyt dlia vykonannia praktychnykh zavdan. K.: Vydavnytstvo NUBiP Ukrainy, 2019 r., 28 p. (in ukr.)

### 12. Recommended sources of information

2. Likar Ya.O., Kava L.P., Yakovliev R.V. Zahalnoi entomolohii: navchalnyi posibnyk. K.: «Komprint», 2019 r. 420 s. (in ukr.)
3. Stefanovska T.R., Kucherovska S.V., Kava L. P., Agricultural Entomology. Kiev: Komprint Press. 2016. 375 p.
4. Guidelines for Insecticide Use. Lexington: University of Kentucky, Department of Entomology, 1999.
5. Guidelines for the Control of Insect and Mite Pests of Foods, Fibers, Feeds, Ornamentals, Livestock, and Households. Washington, DC: United States Department of Agriculture, U.S. Government Printing Office, 1982.
6. Entomology (student reference) university of Missouri-Columbia Instruction materials laboratory, 1991
7. Insect Control Recommendations. Columbia: University of Missouri Extension, 1990