NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of Veterinary Epidemiology and Animal Health

APPROVED
Faculty of Veterinary Medicine
"4" June 2026

CURRICULUM OF ACADEMIC DISCIPLINE "VETERINARY MICROBIOLOGY"

Area of knowledge H «Agriculture, forestry,
fisheries and veterinary medicine»
Specialty H6 «Veterinary Medicine»
Academic programme «Veterinary Medicine»
Faculty of Veterinary Medicine
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Description of the discipline
"VETERINARY MICROBIOLOGY"

The course encompasses the study of the structure, properties, classification, distribution, and the role of microorganisms in the development of infectious diseases in animals. Particular attention is given to pathogenic bacteria, fungi, mycoplasmas, and chlamydiae, as well as methods for their diagnosis, prevention, and control. The course also covers the principles of immunity, the basics of immune prophylaxis, vaccination, sterilization, and disinfection. Studying this discipline provides students with fundamental knowledge for understanding the etiology and pathogenesis of infections, laboratory diagnostic methods, and modern approaches to ensuring well-being within the One Health framework.

Area of knowledge, specialty, academic programme, academic degree		
Academic degree	Master's	
Specialty	H6 Veterinary Medicine	
Academic programme	Veterinary Medicine	
Characteristics of the discipline		
Type	Regulatory	
Total number of hours	120	
Number of ECTS credits	4	
Number of modules	4	
Course project (work) (if any)	-	
Form of assessment	an examination	
Indicators of the discipline for full-time and part-time forms of university study		
	full-time study	extramural study
Year of study	2	
Term	3	
Lectures	30 hours	
Laboratory classes	60 hours	
Self-study	30 hours	
Number of hours per week for full-time students		
Year of study	6 hours	

1. Aim, competences and expected learning outcomes of the discipline

The aim of the course "Veterinary Microbiology" is to provide students with fundamental knowledge of the biology, genetics, and ecology of microorganisms, their role in pathological processes, as well as to develop practical skills in the identification of microorganisms, diagnosis, prevention, and control of infectious diseases in animals.

List of prerequisite educational components for studying the course: Fundamentals of biosafety and bioethics, Anatomy of domestic animals, Cytology, histology, embryology (section Cytology).

Competences acquired:

Integral Competence (IC) The ability to solve complex tasks and problems in the field of veterinary medicine, involving the conduct of research and/or implementation of innovations, characterized by uncertainty of conditions and requirements.

General Competences (GC)

GC 1. Ability for abstract thinking, analysis and synthesis.

GC 4. Ability to communicate in the state language, both orally and in writing.

GC 6. Skills in the use of information and communication technologies.

GC 8. Ability to learn and acquire contemporary knowledge.

GC 12. Commitment to environmental conservation.

GC 13. Ability to make decisions and act in accordance with the principle of non-admissibility of corruption and any other manifestations of dishonesty.

Special (Professional, Subject-Specific) Competences (SC)

SC 3. Ability to comply with occupational health and safety regulations, asepsis and antisepsis during professional activities.

SC 6. Ability to carry out the collection, packaging, preservation and submission of biological material samples for laboratory analysis.

SC 7. Ability to organise and conduct laboratory and specialised diagnostic investigations and analyse their results.

SC 11. Ability to apply knowledge of biosafety, bioethics and animal welfare in professional practice.

SC 16. Ability to protect the environment from contamination by livestock waste as well as veterinary materials and products.

Programme Learning Outcomes (PLO)

PLO 1. To know and correctly use veterinary medical terminology.

PLO 2. To use information from national and international sources for developing diagnostic, therapeutic, and entrepreneurial strategies.

PLO 5. To establish the relationship between clinical manifestations of disease and laboratory test results.

PLO 6. To develop quarantine and control measures, as well as methods of therapy, prevention, diagnosis, and treatment of diseases of various etiologies.

PLO 9. To develop measures aimed at protecting the population from diseases shared between animals and humans.

PLO 17. To know the rules and requirements of biosecurity, bioethics, and animal welfare.

PLO 21. To assess and manage processes in accordance with animal health and welfare requirements, food safety and quality of food of animal origin, by-products, and feed, in line with the "One Health" concept; to justify their relationship with public health; to predict microbiological risks, including zoonoses; and to develop management decisions for their prevention.

Day One Competences (European Union requirements)

2. To understand research methods and the contribution of fundamental and applied research to science, as well as the implementation of the 3Rs principle (Replacement, Reduction, Refinement).

4. To promote and ensure the protection of health and safety of oneself, patients, animal owners, colleagues, and the environment during professional practice; to demonstrate knowledge of quality assurance principles; and to apply risk management principles in practice.

10. To understand and apply the principles of the One Health concept to ensure proper clinical practice in veterinary medicine, as well as evidence-based veterinary medicine.

22. To collect, store, and transport samples, select appropriate diagnostic tests, interpret results, and understand the limitations of test results.

23. To communicate clearly and collaborate with diagnostic laboratories, including the provision and use of relevant results for the development of a patient's medical history.

25. To recognize signs of notifiable animal diseases, zoonoses, and animal abuse, and to take appropriate actions, including reporting to competent authorities.

29. To correctly apply and evaluate biosecurity protocols.

30. To perform aseptic procedures appropriately.

2. Programme and structure of the discipline

Modules and topics	Hours					
	Full-time					
	Total	including				
		L	Lab	P	Ind	Self
1	2	3	4	5	6	7
Module 1. Morphology, taxonomy and physiology of microorganisms						
Topic 1. Introductory lecture. Subject and problems of microbiology.		2	4			2

Topic 2. Morphology and taxonomy of microorganisms.		2	4			2
Topic 3. Morphology of microscopic fungi and base of their taxonomy.		2	4			2
Total for module 1.	**24**	**6**	**12**			**6**
Module 2. Genetics and ecology of microorganisms						
Topic 4. Physiology of microorganisms.		2	4			2
Topic 5. Genetics of microorganisms.		2	4			2
Topic 6. Ecology of microorganisms.		2	4			2
Total for module 2.	**24**	**6**	**12**			**6**
Module 3. Bacterial causative agents of animals: bacilli, clostridia, cocci, enterobacteria.						
Topic 7. The causative agent of anthrax.		2	4			2
Topic 8. Pathogenic cocci.		2	4			2
Topic 9. Causative agent of anaerobic infections.		2	4			2
Topic 10. Pathogenic enterobacteria		2	4			2
Total for module 3.	**32**	**8**	**16**			**8**
Module 4. Bacterial pathogens of animals: listeria, pasteurella, yersinia, leptospira, mycoplasma, chlamydia, rickettsia.						
Topic 11. Brucella and Tularemia pathogen		2	4			2
Topic 12. The causative agent of tuberculosis.		2	4			2
Topic 13. The causative agent of swine. Pasterellosis. Listeriosis.		2	4			2
Topic 14. Pathogenic leptospira.		2	4			2
Topic 15. Pathogenic Mycoplasmas. Chlamydia and Rickettsia.		2	4			2
Total for module 4.	**40**	**10**	**20**			**10**
Total hours	**120**	**30**	**60**			

3. Topics of lectures

#	Topic	Hours
Module 1. Morphology, taxonomy and physiology of microorganisms		
1	Introductory lecture. Subject and problems of microbiology.	2
2	Morphology and taxonomy of microorganisms.	2
3	Morphology of microscopic fungi and base of their taxonomy.	2
Module 2. Genetics and ecology of microorganisms		
4	Physiology of microorganisms.	2
5	Genetics of microorganisms.	2
6	Ecology of microorganisms.	2
Module 3. Bacterial causative agents of animals: bacilli, clostridia, cocci, enterobacteria.		
7	The causative agent of anthrax.	2
8	Pathogenic cocci.	2
9	Causative agent of anaerobic infections.	2

10	Pathogenic enterobacteria	2
Module 4. Bacterial pathogens of animals: listeria, pasteurella, yersinia, leptospira, mycoplasma, chlamydia, rickettsia.		
11	Brucella and tularemia pathogen	2
12	The causative agent of tuberculosis.	2
13	The causative agent of swine. Pasteurellosis. Listeriosis.	2
14	Pathogenic leptospira.	2
15	Pathogenic mycoplasmas. Chlamydia and Rickettsia.	2
Total hours		**30**

4.Topics of laboratory classes

#	Name of Topic	Hours
Module 1. Morphology, taxonomy and physiology of microorganisms		
1	Rules and safety at work in the microbiological laboratory. Light microscope. The main forms of bacteria.	4
2	Preparation, fixation and staining of smears simple method. Special staining techniques of bacteria.	4
3	The study of bacteria in the living state. Morphology of microscopic fungi and their methods research.	4
Module 2. Genetics and ecology of microorganisms		
4	Methods of sterilization. Equipment in Microbiology laboratory. Nutrient media for culturing microorganisms.	4
5	Technology seeding bacteria on nutrient media. Pure cultures of microorganisms.	4
6	Cultural properties of microorganisms. Biochemical properties of microorganisms.	4
Module 3. Bacterial causative agents of animals: bacilli, clostridia, cocci, enterobacteria.		
7	Effect on bacteria physical, chemical and biological factors. Methods for studying microbial antagonism. Sanitary and microbiological objects of the environment.	4
8	The causative agent of anthrax. Pathogenic coccus.	4
9	Pathogenic clostridia	4
10	The causative agent of colibacillosis and salmonellosis	4
Module 4. Bacterial pathogens of animals: listeria, pasteurella, yersinia, leptospira, mycoplasma, chlamydia, rickettsia.		
11	The causative agent of brucellosis. The causative agent of intestinal yersiniosis.	4
12	The causative agent of tuberculosis. The causative agent of pseudotuberculosis. The causative agent of leptospirosis.	4
13	The causative agent of erysipelas. Listeria. The causative agent of pasteurellosis.	4
14	Pathogenic mycoplasmas. Chlamydia and Rickettsia.	4
15	Pathogens of mycoses and mycotoxicosis.	4
Total hours		**60**

5. Topics of self-work

#	Name of Topic	Hours
Module 1. Morphology, taxonomy and physiology of microorganisms		
1	The use of microorganisms in various fields (food, pharmaceutical, medical, oil refining, etc.).	2
2	Methods of preservation of microorganisms. Methods of lyophilic drying of microorganisms.	2
3	Chemical nature, classification and functions of microbial toxins.	2
Module 2. Genetics and ecology of microorganisms		
4	Bacteria as possible agents of bacteriological weapons	2

5	Sanitary-indicative microorganisms	2
6	Immune prophylaxis and immunotherapy of infectious diseases	2
Module 3. Bacterial causative agents of animals: bacilli, clostridia, cocci, enterobacteria.		
7	The causative agent of borreliosis (biology, pathogenic properties, laboratory diagnosis)	2
8	Proteus as pathogens of food poisoning	2
9	Staphylococcal toxicosis (etiology, pathogenesis, laboratory diagnosis)	2
10	Pathogens of hemophilia (biology, pathogenic properties, laboratory diagnosis)	2
Module 4. Bacterial pathogens of animals: listeria, pasteurella, yersinia, leptospira, mycoplasma, chlamydia, rickettsia.		
11	Allergic methods for the diagnosis of zoonoses	2
12	Pathogens of mycotoxicosis	2
13	The causative agent of intestinal yersiniosis (biology, pathogenic properties, laboratory diagnosis)	2
14	Listeria as a causative agent of food poisoning	2
15	Pathogenic spirochetes in human infectious pathology	2
Total hours		**30**

6. Methods of assessing expected learning outcomes:

– oral or written survey;
– test;
– self-assessment.

7. **Teaching methods*:***

– problem-based method;
– practice oriented studying method;
– project education method;

8. Results assessment

The student's knowledge is assessed by means of a 100-point scale converted into the national grades according to the "Exam and Credit Regulations at NUBiP of Ukraine" in force.

8.1 Distribution of points by types of learning activities

Educational activity	Results	Assessment
Module 1. Morphology, taxonomy and physiology of microorganisms		
Laboratory Work 1.	Be able to use a light microscope; prepare bacterial slides for microscopy using simple staining methods.	**18**
Self-work 1.	Know about the use of microorganisms in various industries (food, pharmaceutical, medical, oil refining, etc.).	**5**
Laboratory Work 2.	Be able to apply advanced staining techniques to study the morphology of microorganisms and differentiate them.	**18**
Self-work 2.	Know methods for preserving microorganisms, including lyophilization (freeze-drying).	**5**
Laboratory Work 3.	Be able to study bacteria in their living state.	**18**
Self-work 3.	Know the chemical nature, classification, and functions of microbial toxins.	**6**
Modular Test 1.	Test	**30**
Total for module 1.		**100**
Module 2. Genetics and ecology of microorganisms		
Laboratory Work 4.	Be able to microscopically examine microscopic fungi and cultivate them.	**18**

Self-work 4.	Know about bacteria as potential agents of bacteriological weapons.	**5**
Laboratory Work 5.	Be able to prepare and sterilize glassware, instruments, and nutrient media for bacteriological research. Master bacteriological techniques and isolate pure bacterial cultures.	**18**
Self-work 5.	Know about microorganisms as bio degraders of industrial waste.	**5**
Laboratory Work 6.	Be able to collect samples of water, soil, and air and perform their bacteriological examination; determine bacterial sensitivity to antibiotics.	**18**
Self-work 6.	Analyze the results of sanitary-microbiological assessments of objects.	**6**
Modular Test 2.	Test	**30**
Total for module 2.		**100**
Module 3. Bacterial causative agents of animals: bacilli, clostridia, cocci, enterobacteria.		
Laboratory Work 7.	Be able to study the effects of physical\chemical and biological factors on bacteria. Master methods for determining bacterial sensitivity to antibiotics.	**12**
Self-work 7.	Know the biology and laboratory diagnostic methods of the Lyme disease pathogen (Borrelia).	**5**
Laboratory Work 8.	Be able to collect samples of water, soil, and air and conduct bacteriological examinations of them.	**12**
Self-work 8.	Know about Proteus bacteria as causative agents of foodborne infections.	**5**
Laboratory Work 9.	Be able to detect and identify the anthrax pathogen. Analyze the results of bacteriological studies.	**13**
Self-work 9.	Know the biology and laboratory diagnostic methods of the intestinal yersiniosis pathogen.	**5**
Laboratory Work 10.	Be able to detect and identify causative agents of coccal infections. Analyze the results of bacteriological studies.	**13**
Self-work 10.	Know the biology and laboratory diagnostic methods of pathogens causing haemophilosis.	**5**
Modular Test 3.	Test	**30**
Total for module 3.		**100**
Module 4. Bacterial pathogens of animals: listeria, pasteurella, yersinia, leptospira, mycoplasma, chlamydia, rickettsia.		
Laboratory Work 11.	Be able to detect and identify pathogens of anaerobic infections. Analyze the results of bacteriological studies.	**10**
Self-work 11.	Know about allergic diagnostic methods for zoonoses.	**4**
Laboratory Work 12.	Be able to detect and identify pathogens of pasteurellosis, listeriosis, and erysipelas. Analyze the results of bacteriological studies.	**10**
Self-work 12.	Know the biology and laboratory diagnostic methods of mycotoxicosis pathogens.	**4**
Laboratory Work 13.	Be able to detect and identify pathogens of leptospirosis and brucellosis. Analyze the results of bacteriological studies.	**10**
Self-work 13.	Know the biology and laboratory diagnostic methods of the bubonic plague pathogen.	**4**
Laboratory Work 14.	Be able to detect and identify the tuberculosis pathogen. Analyze the results of bacteriological studies.	**10**
Self-work 14.	Know the biology and laboratory diagnostic methods of the leprosy pathogen.	**4**

Laboratory Work 15.	Be able to detect and identify pathogens of salmonellosis and escherichiosis. Analyze the results of bacteriological studies.	**10**
Self-work 15.	Know the biology and laboratory diagnostic methods of the syphilis pathogen.	**4**
Modular Test 4.	Test	**30**
Total for module 4.		**100**
Class work	**(M1 + M2+M3+M4)/4*0,7 ≤ 70**	
Exam/credit	**30**	
Total for year	**(Class work + exam) ≤ 100**	

8.2 Scale for assessing student's knowledge

Student's rating, points	National grading (exam/credits)
90-100	excellent
74-89	good
60-73	satisfactory
0-59	unsatisfactory

8.3 Assessment Policy

Policy on Deadlines and Retakes	Assignments submitted late without valid reasons will receive a lower grade. Module retakes are allowed only with the lecturer's permission and in case of valid reasons (e.g., medical leave).
Policy on Academic Integrity	Cheating during tests and exams is prohibited, including the use of mobile devices. Written assignments must include proper citations for all referenced literature.
Policy on Attendance	Attendance is mandatory. In cases of valid reasons (e.g., illness, international internship), individual learning arrangements may be made with the approval of the faculty dean.

9. Teaching and learning aids:

1. **Electronic training course of the academic discipline** [Електронний ресурс]. – Режим доступу: https://elearn.nubip.edu.ua/course/view.php?id=1151
2. **Veterinary Microbiology: textbook** / Kozlovska G. V., Melnyk M. V. Київ: ПК «Компринт», 2023. – 252 с.
3. McVey D. Scott, Kennedy Melissa, Chengappa M.M. **Veterinary Microbiology** / McVey D. Scott, Kennedy Melissa, Chengappa M.M. – 3rd ed. – Wiley-Blackwell, 2013. – 648 p.
4. **Ветеринарна мікробіологія: підручник** / В. Г. Скибіцький, В. В. Власенко, Г. В. Козловська та ін.; за ред. В. Г. Скибіцького, В. В. Власенка. – 2-ге вид., змін. і доп. – Київ: ЦП «Компринт», 2016. – 420 с.
5. **Практикум з ветеринарної мікробіології: навчальний посібник** / Козловська Г.В., Мельник М.В., Виговська Л.М., Ігнатовська М.В., Дишкант О.В. – К.: НУБіП, 2026. – 294 с.
6. **Програма та методичні вказівки з навчальної практики з дисципліни «Ветеринарна мікробіологія»** / Г. В. Козловська, Ф. Ж. Ібатулліна, М. В. Мельник. – Київ: ЦП «Компринт», 2017. – 14 с.

10. Recommended sources of information

1. https://phc.org.ua/kontrol-zakhvoryuvan/inshi-infekciyni-zakhvoryuvannya/infekciyna-zakhvoryuvanist-naselennya-ukraini
2. https://efsa.onlinelibrary.wiley.com/
3. https://search.cdc.gov/search/?query=salmonellosis&dpage=1
4. http://jcm.asm.org/
5. http://www.microbiologyinpictures.com/index.html
6. http://www.microbiologyinpictures.com/microbiology%20images%20links.html.