

MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE  
SUMY NATIONAL AGRARIAN UNIVERSITY

Vetsanexamination, microbiology, zoohygiene, safety and quality of animal products Chair

“CONFIRMED”

Chief of Vetsanexamination, microbiology,  
zoohygiene, safety and quality  
of animal products  
Chair (T. I. Fotina)  
" \_\_\_\_\_ 2020

CURRICULUM

III.02 Veterinary Microbiology and Immunology

Training direction: 211 "Veterinary Medicine"

Educational program: OPP "Veterinary Medicine"

Faculty: Veterinary Medicine

2020 – 2021 academic year

Curriculum of Veterinary sanitation and hygiene was worked out for the second-year students of training direction 211 "Veterinary Medicine"

Authors:

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Klishchova Zh.E., assistant

Curriculum has been approbated on the Vetsanexamination, microbiology, zoohygiene, safety and quality of animal products Chair  
Protocol № 18 from "25" June 2020

Chief of Vetsanexamination, microbiology, zoohygiene, safety and quality of animal products  
Chair \_\_\_\_\_ (Doctor, prof. T. I. Fotina)

Coordinated by:

Guarantor of the educational program \_\_\_\_\_ (Ulko L. G)

Dean of the Faculty \_\_\_\_\_ (Nechiporenko O.L)

Methodist of the educational department  
licensing and accreditation \_\_\_\_\_

Registered in the electronic database: date: 03.07. 2020.

## 1. Curriculum description

Name of indicators	Branch of knowledge, direction of training, educational-qualification level	Characteristics of the discipline	
		full-time education	
Credits - 2	Branch of knowledge: <b>21 Veterinary Medicine</b>	<b>Normative</b>	
	Specialty: Veterinary Medicine 211		
Modules - 2		<b>Year of training:</b>	
Content module 2		2020 -2021	
		<b>Course</b>	
		2	
		<b>Semester</b>	
Total hours - 90	Educational degree: magister	3rd	
		<b>Lectures</b>	
		16h.,	
		<b>Practical, seminars</b>	
		<b>Laboratory</b>	
		30h	-
		<b>Independent work</b>	
	44h		
		<b>Type of control:</b>	
		credit	

The ratio of hours of classes to separate and individual work is: for full time - 46 / April 4 % (46/44).

**3 The program of discipline "Veterinary Microbiology and Immunology"  
(approved by the Academic Council of the Faculty of Veterinary Medicine Minutes No11., May 28, 2015)**

**1. The purpose and objectives of educational discipline "Veterinary Microbiology and Immunology"**

**Objective:** The purpose of discipline is to form a deep theoretical and practical knowledge on the role of microorganisms in animal life; Structure and physiology of pathogenic and animal microorganisms, classification of microorganisms; microorganism and environment; The role of the immune system in protecting of organism of animals from infectious agents; Practical skills in microbiological and immunological research methods in the diagnosis and prevention of infectious diseases of animals.

**Task:** To interpret the biological properties of pathogenic and non-pathogenic microorganisms, viruses and patterns of their interaction with macroorganism, with the population of animals and birds and the environment. To define methods of microbiological and immunological diagnostics, etiologic therapy and specific prophylaxis of infectious diseases. Explain the structure of the immune system of the body of animals and birds. To interpret the basic mechanisms of forming the immune response of the organism of animals and birds. Identify the main types of pathological reactions of the immune system and the association with the emergence of the most common diseases of animals and birds.

**As a result of studying the discipline, the student must:**

**Know:**

**Module 1.** The basic concepts and research methods in microbiology. Systematic and nomenclature of microorganisms; Morphology of prokaryotic microorganisms and their differences from eukaryotic. Structure of bacteria, microscopic fungi, viruses, mycoplasmas, rickettsiae. Physiology of microorganisms.

**Module 2.** Genetics and ecology of microorganisms. Forms of interaction between macro and micro-organisms spread of microbes in the environment. Microflora of the soil. The role of algae, bacteria, fungi, actinomycetes in soil-forming processes. The role of soil as a transmission factor for infectious diseases. Microflora of water, air, body of animals, milk, feed, manure.

**Be able:**

**Module 1** Prepare preparations and conduct appropriate color for microscopic examination, to microscopic examination and analysis of the work done. Prepare solutions of dyes, nutrient media, compile a general scheme of bacteriological studies, conduct a bioproduct, determine the sensitivity of the microorganism to antibiotics, and sterilize the material or laboratory utensils, the medium based on the properties of the material.

**Module 2.** Identify circle - titer circles - index and the total number of microorganisms in water, soil, air, feed milk and other objects. Make a conclusion about their sanitary condition.

**Module 1. Morphology and classification of microbes. Physiology of microbes**

**Content module 1. Morphology of bacteria, fungi and viruses.**

**Topic 1. Introduction to Microbiology. Subject and tasks of microbiology. A brief historical essay.** Subject, tasks and achievements of modern microbiology. The role of microorganisms in human life. Differentiation of microbiology in the industry. Relationship of microbiology with other sciences. Periods in the development of microbiology. The significance of microbiology in the training of veterinarians. Methods of study of microorganisms.

**Taxonomy and nomenclature of microorganisms. Morphology of bacteria. Classification and nomenclature of fungi, viruses (phage).** Systematic and nomenclature of bacteria. Classification of bacteria. Morphology of bacteria. Size and form of bacteria: spherical, spiny, rods. Classification of fungi. Structure of zygomycetes. The structure of ascomycetes: the structure of penicillias, aspergillias, yeast fungi. The structure of viruses on the example of the phage. Structure of rickettsia, mycoplasmas.

**Topic 2. Structure of dermatomycetes.** Structure of dermatomycetes. Brief description of fungi. Pathogens of dermatomycosis. Trichophytic Microsporium. Favus.

**Topic. Structure of deuteromitsetiv (imperfect fungi): structure fungi of the genus Fusarium.** Structure of deuteromitsetiv (imperfect fungi), the structure of the fungi of the genus Fusarium. Microscopic fungi and their characteristics. Reproduction of fungi. Classification of fungi. Characteristics of the most important representatives of different classes. The structure of the fungi of the genus Fusarium.

**Topic 3. Characteristics of aniline dyes.** Solutions of dyes. History of obtaining aniline dyes. Classification of aniline dyes. The notion of exhausts. Preparation of solutions of aniline dyes.

**Semantic module 2. Physiology of microorganisms.**

**Topic 4. Physiology of bacteria, fungi, viruses, mycoplasmas, rickettsiae.** Nutrition of bacteria. Enzymes of bacteria. Transport of substances into a bacterial cell. Constructive metabolism. Energy metabolism. The ratio of bacteria to oxygen. Growth and ways of breeding bacteria. Features of breeding mushrooms. Methods of sterilization. Preparation of dishes for sterilization. Cultural method of research. Nutrients and their application in the diagnosis of diseases. Methods of allocating pure culture. Methods of determining the sensitivity of microorganisms to antibiotics. Bio test.

**Topic 5. Equipment and methods of formation of anaerobic conditions.** Requirements for nutrient media for the allocation of anaerobes. Methods and equipment for creating anaerobic conditions: Mechanical removal of oxygen. Chemical binding of oxygen. Method Fornera or biological method.

**Topic 6. Nutrient media used to grow anaerobes.** Requirements for growing anaerobes. Classification of nutrient media used to grow anaerobes. Preparation of media for anaerobes.

**Module 2. Genetics and ecology of microorganisms.**

**Topic 7. Ecology of microorganisms.** General questions. Microflora of the soil. Microflora of manure. The microflora of water. Microflora of air. The microflora of animals.

**Topic 8. Normal and pathogenic microflora water** and methods of identifying and differentiating of microorganisms. The microflora water health assessment for water microbiological parameters. Purification and disinfection of drinking water.

**Topic 9. The normal and pathogenic microflora of soil and methods of identifying and differentiating of microorganisms.** General questions. Normal and pathogenic microflora of the soil. Sanitary evaluation of soil by microbiological indicators.

**Topic 10 Average air and pathogenic microflora** and methods of identifying and differentiating of microorganisms. General questions. Microflora of air. Sanitary and hygienic condition of the air.

**Topic 11 Normal body and pathogenic microflora and methods of identifying and differentiating of microorganisms.** Common Questions Microflora of an organism of animals. Normal microflora.

**Topic 12. Dysbiosis.** Normal microflora. Etiology of dysbiosis. The notion of gnotobiote. The concept of SPF - animals. Diagnosis and treatment of dysbiosis.

**Topic 13. Normal and pathogenic microflora feed.** Epiphytic microflora of plants and its origin.

**Topic 14. The role of microorganisms in the transformation of matter in nature.** Nutrient recycling carbon cycle. Cycle phosphorus, iron and sulfur.

**Topic 15. The impact of environmental factors on microorganisms.** Interconnection between organisms and the environment. Influence of physical factors on microorganisms. Influence of physical and chemical factors on microorganisms. Influence of chemical factors on microorganisms. Influence of antibiotics on microorganisms. Possible ways of regulating microorganisms' vital activity during storage

**4. Structure of the discipline**

The names of content modules and themes	Number of hours				
	Total	Full-time			
		Including			
	Lec.	P	Lab	Ind. W.	
1	2	3	4	5	6
<b>Module 1. Morphology and classification of microbes. Physiology of microbes.</b>					
<b>Content module 1. Morphology of bacteria, fungi and viruses</b>					

<b>Theme 1.</b> Introduction to microbiology. Subject and tasks of microbiology. A brief historical essay.	10	2		4	4
Systematics and nomenclature of microorganisms. Morphology of bacteria. Classification and nomenclature of fungi, viruses (phage).					
<b>Theme 2.</b> Structure of dermatomycetes. Structure of deuteromycetes (imperfect mushrooms): the structure of fungi of the genus Fusarium .	10	2		4	4
<b>Theme. 3.</b> Characteristics of aniline dyes.	4	-			4
<b>Total for content module 1</b>	24	4		8	12
<b>Content module 2. Physiology of microorganisms.</b>					
<b>Topic 4</b> Physiology of bacteria, fungi, viruses, mycoplasmas, rickettsiae.	6	2		2	2
<b>Topic 5.</b> The nutrient medium used for the cultivation of anaerobes.	2			2	2
<b>Total for content module 2.</b>	8	2		4	4
<b>Total for module 1</b>	18	6		6	16
<b>Module 2: Genetics and ecology of microorganisms.</b>					
<b>Topic 6.</b> Ecology of microorganisms .	6	2		2	4
<b>Topic7.</b> The normal and pathogenic microflora water and methods of identifying and differentiating.	2			2	2
<b>Topic8.</b> The normal and pathogenic microflora of soil .	6	2		2	2
<b>Topic9.</b> The normal and pathogenic microflora of air and methods of identifying and differentiating.	4			2	4
<b>Topic10.</b> The normal and pathogenic microflora of body .	4			2	4
<b>Topic 11.</b> The normal and pathogenic microflora of feed .	4			2	2
<b>Topic 12.</b> Microbiology of manure. General questions.	4			2	2
<b>Topic 13.</b> The normal and pathogenic microflora of milk.	4	2		2	2
<b>Topic 14.</b> The role of microorganisms in the transformation of matter in nature.	4			2	4
<b>Topic 15.</b> The impact of environmental factors on microorganisms.	4	2		2	2

<b>Total for 2 content modules.</b>	90	16		30	44
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### 5. Themes and lectures plan

No. / p	topic	Number hours
1	<b>Topic 1. Introduction to Microbiology. The object and purpose of microbiology. A brief history. Subject of taxonomy and nomenclature of microorganisms. Morphology of bacteria. Classification and nomenclature of fungi, viruses (phage).</b> Plan 1. History 2. Commonly treated infectious diseases 3. Causes and transmission of infectious diseases 4. General Concepts 5. Taxonomy	2
2	<b>Topic 3. Physiology of bacteria, Fungi, Viruses, Mycoplasma, Rickettsia. Definition of general concepts infection. Classification and form infections.</b> Plan. 1. Physiology of bacteria 2. Fungi 3. Viruses 4. Mycoplasma, 5. Rickettsia 6 Infection 7 Infection control	2
3	<b>Topic 5. Properties of pathogens</b> Plan. 1. Microorganisms – Introduction 2. Properties of pathogens	2
4	<b>Topic 6. Pathogenicity and Virulence</b> Plan. 1. Pathogenicity 2. Virulence 3. What is the difference between Pathogenicity and Virulence?	2
5	<b>Topic 9. Characteristics of antigens.</b> Plan. 1. Antigen 2. Allergen	2
6	<b>Topic 10. Laboratory diagnosis</b> Plan. 1. Laboratory diagnosis 2. Laboratory diagnosis of bacterial disease	2
7	<b>Topic 12. Vaccines</b> Plan 1. Classification of vaccines, 2. Methods of vaccines production 3. Control of vaccines.	2
8	<b>Topic 13. Disinfection and other aspects of disease control</b> Plan 1. Disinfection 2. Aspects of disease control	2
	Together	<b>16</b>

### 6. Topics laboratory classes

No. / p	topic	Number hours
1	<b>Topic 1.</b> Microbiology Laboratory Safety Rules and Procedures. Different Size, Shape and Arrangement of Bacterial Cells	2
2	<b>Topic2.</b> Gram Staining. How Does Gram Staining Work?	2
3	<b>Topic 3.</b> Bacterial Staining Techniques II I. Differential Stains: Acid-fast Stain II.	2
4	<b>Topic 4.</b> <a href="#">Differential Staining: Capsule and Spore Staining</a>	2

5	<b>Topic 5.</b> Research bacteria in unstained condition	<b>2</b>
6	<b>Topic 6.</b> Lines sterilization. Sterilization of culture media and equipment. Prepare dishes for sterilization.	<b>2</b>
7	<b>Topic 7.</b> Microbiological diagnosis of infectious diseases	<b>2</b>
8	<b>Topic 8.</b> Methods of isolation of pure culture.	<b>2</b>
9	<b>Topic 9.</b> Properties and Classification of Microorganisms	<b>2</b>
10	<b>Topic 10.</b> Examples of Antibiotic Sensitivity Testing Methods.	<b>2</b>
11	<b>Topic 11.</b> The immune system of animals. Reactions immunity:	<b>2</b>
12	<b>Topic 12.</b> Immune response, RA.	<b>2</b>
13	<b>Topic 13.</b> Mechanisms innate immunity and animal pathogens	<b>2</b>
14	<b>Topic 14.</b> Allergies and the Immune System	<b>2</b>
15	<b>Topic 15.</b> Antibody–antigen interactions	<b>2</b>
	<b>Together</b>	<b>30</b>

### 7. Independent work

No. / p	topic	Number hours
1	<b>Topic.</b> 1. Structure of dermatomycetes. Brief description of fungi. Pathogens dermatomycoses. Trichofytosis. Microsporia. Favus.	5
3	<b>Topic.</b> 2 Ecology of microorganisms. General questions. Soil microflora.	5
4	<b>Topic 3.</b> Normal and pathogenic microflora of water and methods of identifying and differentiating of microflora. The microflora of water Sanitary grade of water for microbiological parameters Cleaning and disinfection of drinking water.	5
5	<b>Topic 4.</b> Normal and pathogenic microflora of soil and methods of identifying and differentiating of microflora. . General questions. The normal and pathogenic microflora of soil. Soil health assessment for microbiological parameters. .	5
6	<b>Topic 5.</b> The normal and pathogenic microflora air and methods of identifying and differentiating of microflora. General questions. The microflora of air. Sanitary of air quality.	5
7	<b>Topic 6.</b> The normal and pathogenic microflora of body and methods of identifying and differentiating of microorganism. General questions of animals microflora. Normal microflora	9
8	<b>Topic 7.</b> Dysbiosis. Normal microflora. Etiology of dysbiosis.	
	<b>Together</b>	44

### 7. Methods of Training

#### 1. Training Methods for Knowledge:

1.1. **Verbal:** narrative, explanation, discussion (heuristic and reproductive), lecture, instruct, work with the book (read, transfer, discharge, scheduling, reviewing, summarizing, making tables, charts, reference compendia etc.).

1.2. **Visual:** demonstration, illustration.

1.3. **Practical:** practical work, exercise, production practices.

#### 2. Methods for studying the nature of the logic of knowledge.

2.1. **Analytical**

2.2. **Synthesis**

2.3. **Inductive method**

2.4. **Deductive method**

#### 3. Methods for studying the nature and level of independent mental activity of students.

3.1. **Problem (problem-information)**

3.2. **Partly-search (heuristic)**

3.3. **Exploratory**

3.4. **Reproductive**

3.5. **Explanatory demonstration**

4. **Active learning methods** – use of technical training, brainstorming, debates, roundtables, business and role-playing games, training, use of problem situations, self-knowledge, the use of educational tests and controlling the use of basic lectures.

5. **Interactive learning technology** – the use of multimedia technology.

### 8. Methods of control

1. Rating control of a 100-point scale assessment ECTS.

2. An intermediate control during the semester (interim certification).

3. Criteria assess of the current work of students:

- the level of knowledge demonstrated in practical classes;
- active in the discussion of issues brought to the class;
- quick control during classes;
- self-study topics in general or specific issues;



- perform analytical calculation tasks;
  - writing essays;
  - test results;
  - writing assignments during the tests;
  - production situations, cases and more.
4. Direct consideration in the final assessment of student performance of certain individual tasks:
- educational and practical study of the presentation of results and more.

#### 10. Distribution points that get students to offset

Routine testing and independent work						Total, for modules and I.W	Aattestation	Total
module 1		module 2		module 3		85 (70 + 15)	15	100
Content module 1	Content module 2	Content module 3	Content module 4	Content module 5	Content module 6			
T 1-T5	T 6 T8	T9-T19	T20	T21-T22	T23-T30			
10	10	10	10	10	20			
20		20		30				

#### Grading scale: national and ECTS

Total points for all the educational activities	Mark ECTS	Ukrainian mark	
		For the exam, course project (work) practices	For the test
90 – 100	<b>A</b>	Excellent	Passed
82-89	<b>B</b>	Good	
75-81	<b>C</b>	Satisfactory	
69-74	<b>D</b>		
60-68	<b>E</b>	Bad	No passed
35-59	<b>FX</b>		
1-34	<b>F</b>		Repeated study of the course

#### 10. Methodical Support

1. Fotin A.I, Fotina G.A Guidance "Veterinary erology and iatrogenic" for independent work of students of veterinary medicine. / Amounts 2010, the year 44 centuries.
2. Fotin A.I, Fotina G.A Guidance on "Moral and ethical requirements for veterinary" for independent work of students of the Faculty of Veterinary Medicine/ Amounts 2010, 70 Art.
3. Fotin G.A, Fotina A. Guidance "The value of professional ethics in the life of a doctor of veterinary medicine" for independent work of students of veterinary medicine full-time / Amounts 2012rik, 42st.
4. Livoschenko LP and other. Laboratory diagnosis of bacterial infections: Manual. - Amounts 20 17 . - 150 p.
5. Livoschenko LP "veterinarian in microbiology. Bacteriology »guide . - Amounts 201 7 . - 135 p.
6. Livoschenko LP and other. "Veterinary Microbiology. Bacteriology". A good guide. - Sumy, 2008. - 134 p.
7. Livoschenko LP and other. Microbiology. Biological veterinary medicines. Guidelines for independent work. - Sumy, 2006. - 107 p.

#### 11. Suggested Reading Basic

1. Veterinary microbiology and Microbial Diseases R.J. Quinn, B.K. Markey, M.E. Carter, W.J. Donnelly, and F. C. Leonard
2. Clinical veterinary microbiology Second edition PDF Bryan Maccey, Finola Leonard, Mirie Archambault, Ann Gullinane, Dores Maguire
3. Essentials of Veterinary Bacteriology and Mycology PDF Sixth Edition G.R. Carter, Darla J. Wase 2003

#### 4. Additional

5. 1. Veterinary microbiology 3rd ed. PDF / editors, D.S. McVey, Melissa Kennedy, M.M. Chengappa.
6. Concise Review of Veterinary Microbiology 2nd Edition PDF R.J. Quinn, B.K. Markey, F. C. Leonard, E, S. Fitzpatrick, S. Fanning

#### 12. Information Resources

1. <http://vet.gov.ua/> - The State Veterinary and Phytosanitary Service of Ukraine
2. <http://www.studfiles.ru/preview/3541647/>

