NATIONAL UNIVERSITY OF LIFE AND ENVIRONMENTAL SCIENCES OF UKRAINE

Department of Animal and Food Hygiene
named after prof. A.K. Skorokhodko

APPROVED
Faculty of Veterinary Medicine
02.06.2026

CURRICULUM OF ACADEMIC DISCIPLINE

ANIMAL HYGIENE

Area of knowledge 21 – «Veterinary medicine»
Specialty 211 – «Veterinary Medicine»
Academic programme «Veterinary Medicine»
Faculty of Veterinary Medicine
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Kyiv – 2026

DESCRIPTION OF THE DISCIPLINE «ANIMAL HYGIENE»

The academic discipline «Animal Hygiene» is necessary for students to study and master the main provisions concerning health protection, disease prevention and improvement of animal productivity, as well as the production of high-quality and biologically complete animal products. The purpose of the discipline is to provide students with knowledge of the foundations of modern zoohygienic science and practice so that they can implement a set of sanitary measures on farms aimed at preserving health, increasing productivity and reducing the cost of livestock products. The subject of the discipline is the preservation of the health of farm animals, ensuring animal productivity and high product quality. The primary task of modern hygiene is the timely identification of environmental factors harmful to animal health and the development of preventive measures aimed at eliminating them; scientific and practical substantiation of microclimate parameters; development of sanitary and hygienic rules, standards and rational methods of housing, feeding, watering and using various species of farm animals with mandatory environmental protection.

Academic degree, specialty, academic programme		
Academic degree	Master's	
Specialty	211 «Veterinary Medicine»	
Academic programme	«Veterinary Medicine»	
Characteristics of the discipline		
Type	compulsory	
Total number of hours	120	
Number of ECTS credits	4	
Number of modules	2	
Form of assessment	exam	
Indicators of the discipline for full-time and part-time forms of university study		
	full-time	part-time
Year of study	3	
Semester	V	
Lectures	30 hours	
Practical classes and seminars		
Laboratory classes	60 hours	
Self-study	30 hours	
Number of hours per week for full-time students	6 hours	

1. AIM, OBJECTIVES, COMPETENCES AND EXPECTED LEARNING OUTCOMES OF THE DISCIPLINE

Aim: to provide students with theoretical and practical knowledge of modern hygiene and sanitation for carrying out a set of veterinary and sanitary measures aimed at preserving health, increasing animal productivity and obtaining high-quality products that are safe for consumption.

Objectives: acquisition of theoretical knowledge and practical skills for professional activity, namely:

- organization of sanitary and hygienic measures aimed at creating an optimal microclimate for animals;
- control and organization of measures for the prevention of infectious, invasive and non-contagious animal diseases;
- provision of animals with high-quality feed resources and compliance with the rules and regimes of feeding and watering animals, taking into account species, age and productive characteristics;
- introduction into livestock practice of modern gentle technologies for housing and use of animals, as well as their health improvement (exercise, hardening, insolation, etc.);
- carrying out objective professional assessment of modern industrial technologies, taking into account the positive and negative consequences of their use in animal husbandry;
- planning and implementation of comprehensive veterinary-sanitary and ecological-hygienic measures aimed at optimizing the ecological environment and restoring its damaged segments.

List of academic disciplines that precede the study of the discipline «Animal Hygiene»

1. Veterinary Ecology
2. Animal Feeding
3. Animal Physiology
4. Fundamentals of Animal Breeding

Acquisition of competences:

Integral competence (IC): Ability to solve complex tasks and problems in the field of veterinary medicine, involving research and/or innovation, and characterized by uncertainty of conditions and requirements.

General competences (GC):

GC 2. Ability to apply knowledge in practical situations.
GC 3. Knowledge and understanding of the subject area and profession.
GC 7. Ability to conduct research at an appropriate level.
GC 9. Ability to make informed decisions.
GC 12. Commitment to environmental preservation.
GC 13. Ability to make decisions and act in compliance with the principle of zero tolerance for corruption and any other manifestations of dishonesty.

Professional (special) competences (PC):

PC 2. Ability to use tools, special devices, instruments, laboratory equipment and other technical means to perform necessary manipulations during professional activity.
PC 6. Ability to select, package, fix and send samples of biological material for laboratory testing.

PC 7. Ability to organize and conduct laboratory and special diagnostic studies and analyze their results.
PC 10. Ability to develop strategies for safe and sanitary housing of animals.
PC 11. Ability to apply knowledge of biosafety, bioethics and animal welfare in professional activity.
PC 16. Ability to protect the environment from contamination by livestock waste, as well as veterinary materials and products.
PC 19. Ability to carry out educational activities among industry workers and the population.

Program learning outcomes (PLO):

PLO 7. Formulate conclusions regarding the effectiveness of selected methods and means of animal housing, feeding and treatment, prevention of contagious and non-contagious diseases, as well as production and technological processes at enterprises for keeping, breeding or using animals of various classes and species.
PLO 17. Know the rules and requirements of biosafety, bioethics and animal welfare.
PLO 18. Maintain accounting and reporting documentation during professional activity.
PLO 19. Carry out educational activities among industry workers and the population.

Day One Competences:

1. Demonstrate an understanding of the ethical and legal framework within which a veterinarian must work, including professional aspects and aspects related to animal welfare, animal owners, public health, social and environmental aspects related to professional activity.
3. Demonstrate basic knowledge of organization, management and legislation related to veterinary practice. Understand the economic and emotional context in which a veterinarian works.
5. Communicate effectively with animal owners, the public, professional colleagues and relevant authorities, using language appropriate to the audience and observing the principles of full respect for confidentiality and privacy.
6. Implement principles of effective interpersonal interaction, including communication, leadership, management, teamwork, mutual respect and other soft skills.
12. Use professional abilities to promote the development of veterinary knowledge and implement the One Health concept to promote the health, safety and welfare of animals, humans and the environment, as well as to achieve the UN Sustainable Development Goals.
21. Assess the physical condition, welfare and nutritional status of an animal or group of animals and advise the animal owner on the principles of housing, feeding, reproduction, productive qualities, welfare, individual health, herd health and public health.
26. Access relevant information sources and legislation related to animal care and welfare, animal movement, notifications concerning animal care and welfare, movement of animals, notifiable diseases, and the use of medicinal products, including the responsible use of antimicrobials.

2. PROGRAMME AND STRUCTURE OF THE DISCIPLINE «ANIMAL HYGIENE» FOR FULL-TIME FORM OF STUDY

Modules and topics	Number of hours						
	Full-time						
	Week	Total	including				
			lec	pr	lab	ind	ind. w
1	2	3	4	5	6	7	8
1. Subject and methods of animal hygiene. Animal hygiene as the basis for preserving animal health.	1	8	2		4		2
2. Climatic factors and their influence on the animal organism. Hygienic significance of temperature, humidity and air velocity.	2	8	2		4		2
3. Dust and microbial contamination of air.	3	8	2		4		2
4. Hygienic significance of light. Solar radiation.	4	8	2		4		2
5. Gas composition of air. Harmful gases.	5	7	2		4		1
6. Hygienic requirements for the design, construction and operation of livestock buildings. Territory zoning.	6	7	2		4		1
7. Feed hygiene. Requirements for the quality and safety of feed and feed additives.	7	7	2		4		1
8. Manure removal systems in livestock buildings. Bedding and its hygienic significance.	8	7	2		4		1
Together on the content module 1		**60**	**16**		**32**		**12**
9. Hygiene of water and water supply for livestock facilities.	9	9	2		4		3
10. Hygiene of cattle.	10	9	2		4		3
11. Hygiene of horses.	11	9	2		4		3
12. Hygiene of pigs.	12	9	2		4		3
13. Hygiene of sheep and goats.	13	8	2		4		2
14. Hygiene of rabbits.	14	8	2		4		2
15. Hygiene of poultry.	15	8	2		4		2
Together on the content module 2		**60**	**14**		**28**		**18**
Total hours		**120**	**30**		**60**		**30**

3. TOPICS OF LECTURES

№	Topic title	Hours
	Module 1	
1	Topic 1. Subject and methods of animal hygiene. Animal hygiene as the basis for preserving animal health.	2
2	Topic 2. Climatic factors and their significance in the hygiene of farm animals.	2
3	Topic 3. Zone of thermal neutrality. Thermoregulation of the animal organism.	2
4	Topic 4. Hygienic significance of light. Solar radiation.	2
5	Topic 5. Gas composition of air. Harmful gases.	2
6	Topic 6. Hygienic requirements for the design, construction and operation of livestock buildings. Territory zoning.	2
7	Topic 7. Feed hygiene. Requirements for the quality and safety of feed and feed additives.	2
8	Topic 8. Manure removal systems in livestock buildings. Bedding and its hygienic significance.	2
	Module 2	
9	Topic 9. Hygiene of water and water supply for livestock facilities.	2
10	Topic 10. Hygiene of cattle.	2
11	Topic 11. Hygiene of horses.	2
12	Topic 12. Hygiene of pigs.	2
13	Topic 13. Hygiene of sheep and goats.	2
14	Topic 14. Hygiene of rabbits.	2
15	Topic 15. Hygiene of poultry.	2
Total		30

4. TOPICS OF LABORATORY CLASSES

№	Topic title	Hours
	Module 1	
1	Introduction. Safety rules in the hygiene laboratory. Determination of air temperature, enclosing structure temperature and atmospheric air pressure.	4
2	Determination of hygrometric air indicators in livestock buildings. Determination and evaluation of the temperature-humidity index.	4
3	Determination of cooling capacity, air velocity and noise in livestock buildings. Determination of the wind rose and the aerorhumbogram of the building.	4
4	Determination of dust content and the number of microorganisms in the air of livestock buildings.	4
5	Determination of the content of harmful gases in indoor air (ammonia, carbon dioxide and hydrogen sulfide).	4
6	Determination of illumination in livestock buildings by lighting-engineering and geometric methods.	4
7	Determination of the efficiency of ventilation in livestock buildings.	4

8	Determination of the heat balance of livestock buildings. Module 1 test control.	4
Module 2		
9	Soil hygiene; determination of the physical and chemical properties of soil. Sanitary indicators of soil. Hygrometric indicators of soil.	4
10	Hygienic evaluation of concentrated and rough feeds and methods for monitoring their quality. Determination of grain test weight, husk content and acidity.	4
11	Determination of nitrates, nitrites and solanine in succulent feeds. Determination of the quality of preserved feeds.	4
12	Sanitary and topographic examination of a water source. Rules for sampling water from different sources (river, lake, well, water supply network). Determination of physical properties of water (temperature, transparency, turbidity, color).	4
13	Mineralization of organic pollutants. Determination of ammonia, nitrates and nitrites in water. Determination of sulfates, chlorides and iron in water.	4
14	Determination of dissolved oxygen content in water and biological oxygen demand of water.	4
15	Methods of water purification and disinfection. Determination of water chlorine demand and active chlorine content in chlorinated lime. Water chlorination, water chlorine demand. Module 2 test control.	4
Total		60

5. TOPICS FOR SELF-STUDY

№	Topic title	Hours
1	Legislative acts, organization and control of animal welfare during housing.	3
2	Aeroionization. UV rays. Mechanism of their direct and indirect effects on the animal organism.	3
3	Hygienic requirements for selecting a site for stable construction. Internal equipment.	3
4	Biogeochemical provinces. Prevention of non-contagious animal diseases.	3
5	Effect of high air temperatures on the animal organism. Heat stroke and its difference from sunstroke.	3
6	Treatment and disinfection of wastewater. Sanitary rules for wastewater discharge into water bodies.	3
7	Modern methods of manure removal from livestock buildings. Methods of storage and disinfection.	3
8	Hygienic requirements for feeders, tie-stalls, floors in cowsheds and bedding material. Bedding standards for different animal species.	3

9	Hygiene of weaning and rearing foals. Hygienic requirements for feed. Prevention of animal poisoning by cyanides, nitrates and solanine.	3
10	Certification of water sources. Sources of water supply for livestock farms and their sanitary and hygienic evaluation. Self-purification of water in nature and its sanitary and hygienic significance.	3
Total		30

6. TOOLS FOR ASSESSING EXPECTED LEARNING OUTCOMES:

- exam;
- module tests;
- report and presentation of work materials.

7. TEACHING METHODS:

- verbal method (lecture, discussion, interview, etc.);
- practical method (laboratory classes);
- visual method (illustration method, demonstration method);
- work with educational and methodological literature (note-taking, thesis writing, annotation, reviewing, preparing an essay);
- video method (distance, multimedia, web-oriented, etc.);
- independent work (completion of assignments);
- individual assignments.

8. ASSESSMENT OF LEARNING OUTCOMES

Assessment of the knowledge of a higher education student is carried out on a 100-point scale and converted into national grades according to Table 1 of the current «Regulations on Examinations and Credits at NULES of Ukraine»:

- exam;
- oral or written questioning;
- module testing;
- presentations and speeches during classes.

8.1. Distribution of Points by Types of Educational Activity

Type of educational activity	Learning outcomes	Assessment
Content Module 1. Hygiene of Air and Livestock Buildings		
Laboratory work 1	Know the characteristics of the physical, chemical and biological properties of the air environment. Know the lighting and ventilation systems of livestock buildings, their characteristics and significance. Know the requirements for ventilation and heating of livestock buildings. Be able to determine microclimate parameters in livestock buildings	8
Laboratory work 2		8
Laboratory work 3		8
Laboratory work 4		8
Laboratory work 5		8
Laboratory work 6		8
Laboratory work 7		8
Laboratory work 8		8

Independent work 1	and carry out their sanitary and hygienic evaluation from the standpoint of animal welfare.	6
Module control 1		30
Total for Module 1		**100**
Content Module 2. Hygiene of Water. Special Animal Hygiene		
Laboratory work 9	Know the requirements of current legislation regarding conditions of housing, care and use of productive animals. Know the systems and methods of keeping farm animals. Know the requirements of current regulatory documents regarding the quality and safety of water and feed. Know the requirements for disinfection of drinking and wastewater. Know sanitary and hygienic requirements for soil and bedding. Know methods of manure removal from livestock buildings and requirements for manure. Be able to carry out a sanitary and hygienic assessment of housing conditions for different species and technological groups of animals.	9
Laboratory work 10		9
Laboratory work 11		9
Laboratory work 12		9
Laboratory work 13		9
Laboratory work 14		9
Laboratory work 15		9
Independent work 2		7
Module control 2		30
Total for Module 2		**100**
Coursework	**(M1 + M2) / 2 * 0.7**	**≤ 70**
Exam		**30**
Total for the course	**Coursework + final assessment**	**≤ 100**

8.2. Scale for Assessing the Knowledge of Higher Education Students

Student rating, points	Grade according to the national system (exams/credits)
90-100	excellent
74-89	good
60-73	satisfactory
0-59	unsatisfactory

8.3. Assessment Policy

Policy on deadlines and retaking	Modules may be retaken with the permission of the lecturer if there are valid reasons (for example, sick leave). Admission to the final test is granted if the student has ≥ 42 points for coursework.
Policy on academic integrity	Cheating during module tests and the exam is prohibited, including the use of mobile devices.
Attendance policy	Class attendance is compulsory. In cases of objective reasons (for example, illness, international internship), missed classes are completed in face-to-face form, except in cases

	provided for by orders of the rector or directives of the faculty dean.

9. EDUCATIONAL AND METHODOLOGICAL SUPPORT

- electronic learning course of the academic discipline on the NULES of Ukraine eLearn portal - https://elearn.nubip.edu.ua/course/view.php?id=1748;
- lecture notes and their presentations in electronic form;
- textbooks, study guides, practical manuals;
- methodological materials for studying the academic discipline for full-time higher education students.

10. RECOMMENDED SOURCES OF INFORMATION

1. Zakharenko M.O., Zasekin D.A., Poliakovskyi V.M., Mykhalska V.M. General Animal Hygiene: study guide. Kyiv: NULES of Ukraine, 2024. 252 p.
2. Zakharenko M.O., Ibatullin I.I., Poliakovskyi V.M., Mykhalska V.M., Kryvenok M.Ya., Chepil L.V. Animal Housing and Hygiene. Keeping Sheep and Goats: study guide. Part III. Kyiv: FOP Yamchynskyi O.V., 2021. 457 p.
3. Zakharenko M.O., Poliakovskyi V.M., Chepil L.V., Mykhalska V.M., Shevchenko L.V., Kurbatova I.M. Animal Housing and Hygiene. Keeping Pigs: study guide. Part IV. Kyiv: FOP Yamchynskyi O.V., 2022. 425 p.
4. Zakharenko M.O., Poliakovskyi V.M., Mykhalska V.M., Chepil L.V., Shevchenko L.V., Kurbatova I.M. Animal Housing and Hygiene. Requirements for Water, Water Supply and Wastewater Disposal at Livestock Enterprises: study guide. Part V. Kyiv: FOP Yamchynskyi O.V., 2023. 536 p.
5. Poliakovskyi V., Mykhalska V., Chepil L., Syrotina O. Animal husbandry and hygiene. Keeping poultry. Part I. Kyiv: NPE Yamchynskyi O.V., 2023. 504 p.
6. Poliakovskyi V., Mykhalska V., Chepil L., Syrotina O. Animal husbandry and hygiene. Keeping poultry. Part II. Kyiv: NULES of Ukraine, 2023. 389 p.
7. Zakharenko M.O., Poliakovskyi V.M., Mykhalska V.M., Shevchenko L.V. Ethology and Animal Welfare: textbook. Kyiv: NULES of Ukraine, 2021. 625 p.

Methodological materials for studying the academic discipline for full-time higher education students

Zakharenko M.O., Zasekin D.A., Poliakovskyi V.M., Mykhalska V.M., Solomon V.V. Methodological manual for laboratory classes in the discipline “Animal Hygiene” for students of the Faculty of Veterinary Medicine. Kyiv: Aristei, 2023. 198 p.

Program of educational (production) practice of the academic discipline

Zasekin D.A., Zakharenko M.O., Poliakovskyi V.M., Mykhalska V.M., Solomon V.V., Dymko R.O. Workbook for conducting educational practice for students of the Faculty of Veterinary Medicine in the discipline “Animal Hygiene”. Kyiv: CP “Komprynt”, 2019. 18 p.

Additional Recommended Sources of Information

1. Bondar A.O., Poruchnyk M.M., Tarasenko L.O., Rud V.O. Animal Hygiene and Veterinary Sanitation: study guide / ed. by A.O. Bondar. Mykolaiv: MNAU, 2018. 179 p.
2. Voroniak V.V., Chornyi M.V., Mylostyvyi R.V. Veterinary Hygiene and Sanitation: practical manual. Lviv: FOP Korpan B.I., 2023. 284 p.
3. Dovzhenko L.V., Linkova I.K. Hygiene with Fundamentals of Ecology: educational and methodological guide for medical higher education institutions of I-III accreditation levels. Approved by the Ministry of Health. Kyiv, 2017. 49 p.
4. Lastkov D.O., Serheta I.V., Shvydkyi O.V., Serhiienko A.Yu. et al. Fundamentals of Ecology and Preventive Medicine: textbook for medical higher education institutions of I-III accreditation levels. Approved by the Ministry of Health. Kyiv, 2017. 472 p.
5. Polishchuk V.M., Zasekin D.A., Bilko T.O., Poliakovskyi V.M., Solomon V.V. Hygiene and Specific Features of Transportation of Animals and Animal Products. Kyiv: Center of Educational Literature, 2020. 520 p.
6. Zakharenko M.O., Poliakovskyi V.M., Mykhalska V.M., Shevchenko L.V., Chepil L.V. Industrial Ecology of Processing Enterprises: study guide. Kyiv: FOP Yamchynskyi O., 2024. 400 p.
7. Departmental standards of technological design. Poultry enterprises VNTP-APK 04.05. Ministry of Agrarian Policy of Ukraine. Kyiv, 2005. 90 p.
8. System of removal, processing, preparation and use of manure. VNTP-SHIP-46-4-94. Kyiv: Noosfera, 1994. 36 p.
9. Departmental standards of technological design. Cattle enterprises (complexes, farms, small farms) VNTP-APK-01.05. Ministry of Agrarian Policy of Ukraine. Kyiv, 2005. 112 p.
10. Departmental standards of technological design. Pig enterprises (complexes, farms, small farms) VNTP-APK-02.05. Ministry of Agrarian Policy of Ukraine. Kyiv, 2005. 98 p.
11. Departmental standards of technological design. Sheep and goat enterprises VNTP-APK-03.05. Ministry of Agrarian Policy of Ukraine. Kyiv, 2005. 88 p.
12. Departmental standards of technological design. Horse enterprises VNTP-APK-06.07. Ministry of Agrarian Policy of Ukraine. Kyiv, 2007. 56 p.
13. Departmental standards of technological design. Fur animal and rabbit breeding enterprises VNTP-APK-05.07. Ministry of Agrarian Policy of Ukraine. Kyiv, 2008. 68 p.
14. Mezhenskyi H., Povod M., Mykhalko O., Borshchenko V., Verbelchuk S., Lavryniuk O., Verbelchuk T., Mykhalska V. The efficiency of raising hybrid piglets of English origin in a two-phase method with different durations. Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development. 2024. Vol. 24, Issue 3. P. 559-568. URL: https://managementjournal.usamv.ro/pdf/vol.24_3/volume_24_3_2024.pdf
15. Oliynyk V., Zacharenko M., Shevchenko L., Mykhalska V., Poliakovskyi V., Slobodyanyuk N., Ivaniuta A., Pylypchuk O., Omelian A., Gruntkovskyi M. Evaluation of metabolic status in Holstein cow under short-term cold stress. Online Journal of Animal and Feed Research. 2025. Vol. 15, Issue 2. P. 60-67. URL: https://www.scopus.com/record/display.uri?eid=2-s2.0-105003498128&origin=recordpage

Information Resources

1. Rules for keeping horses: https://viking.com.ua/blog/pravila-utrimannya-koney

2. Practical guide to horse keeping: https://eu.worldhorsewelfare.org/documents/horse-guide/ukranian-version-eu-horse-guide.pdf
3. Technology of keeping sheep: https://agro-business.com.ua/tvarynnytstvo-ta-veterynariya/vivcharstvo/item/7979-tekhnolohiia-utrymannia-ovets.html
4. Organization of sheep breeding: http://feb.tsatu.edu.ua/ebook/mn/ov/page15.html
5. Pasture keeping of sheep: http://lib.osau.edu.ua/jspui/bitstream/123456789/4096/1/%D0%9F%D0%B0%D1%81%D0%BE%D0%B2%D0%B8%D1%89%D0%BD%D0%B5%20%D1%83%D1%82%D1%80%D0%B8%D0%BC%D0%B0%D0%BD%D0%BD%D1%8F%20%D0%BE%D0%B2%D0%B5%D1%86%D1%8C.pdf
6. Breeding Romanov sheep: https://www.hrytsivrada.gov.ua/korysna-informatsiia/rozvedennia-ovets-romanivskoi-porody-v-domashnikh-umovakh/
7. On approval of Veterinary and Sanitary Requirements for keeping poultry in personal peasant farms: https://ips.ligazakon.net/document/RE13309
8. Modern systems of laying hen housing: http://market.avianua.com/?p=4181
9. Specific features of pond fish farming and methods of fish breeding in fish farms: https://sm.darg.gov.ua/_osoblivosti_stavkovogo_0_0_0_1778_1.html
10. Creating a business for fish breeding and sales in Ukraine: https://business-broker.com.ua/blog/stvoriuiemo-biznes-z-rozvedennia-ta-prodazhu-ryby-v-ukraini/
11. http://svynarstvo.in.ua/
12. http://agroua.net/animals/
13. http://www.agro-business.com.ua/
14. http://www.agrosoyuz.com/ua/konsalting/molochnoe-zhivotnovodstvo/
15. http://kombikorm.com.ua/news/
16. Waste utilization methods: international experience: http://efm.vsau.org/files/pdfa/2695.pdf
17. Waste utilization as one way of ecologizing production: http://elartu.tntu.edu.ua/bitstream/lib/21344/2/IRSP_2017_Melnyk_L-Waste_utilization_as_a_way_39-40.pdf
18. Waste processing in developed countries: http://www.biowatt.com.ua/analitika/pererobka-vidhodiv-v-rozvinenih-krayinah-svitu/
19. Combating production waste: http://pidruchniki.com/14201126/ekologiya/borotba_vidhodami_virobnitstva
20. Essence of anthropogenic environmental problems: http://pidruchniki.com/75688/ekologiya/sutnist_antropogennih_problem_dovkillya#58
21. Regulatory and legal support for environmental expertise: http://pidruchniki.com/75691/ekologiya/normativno-pravove_zabezpechennya_ekologichnoyi_ekspertizi#79
22. Monitoring pollution of wastewater from dairy processing enterprises: http://science.lpnu.ua/sites/default/files/journal-paper/2017/jun/4108/givlyud.pdf
23. Sorption treatment of wastewater from dairy processing enterprises from lactic acid: http://eco.com.ua/content/sorbciyne-ochyshchennya-stichnyh-vod-molokopererobnyh-pidpryyemstv-vid-molochnoyi-kysloty
24. Environmental safety in poultry production: http://eztuir.ztu.edu.ua/jspui/bitstream/123456789/1420/1/32.pdf
25. On approval of the Rules for Acceptance of Wastewater into Centralized Sewerage Systems and the Procedure for Determining the Amount of Payment Charged for Excessive

Wastewater Discharges into Centralized Sewerage Systems: http://zakon3.rada.gov.ua/laws/show/z0056-18
26. Optimal selection of methods for treating wastewater and surface water: http://www.dgma.donetsk.ua/docs/konf/2017/mkonf2017/dopovidy/mat.model/%D0%A5%D0%B0%D0%BB%D0%B0%D0%BD%D1%87%D1%83%D0%BA-%D0%9A%D0%BE%D1%80%D0%BE%D1%82%D1%83%D0%BD.pdf
27. Environmental protection technologies. Methods of wastewater treatment: http://vasilkivskiy.vk.vntu.edu.ua/file/046f9e799944569d40999cc83ed343c7.pdf