

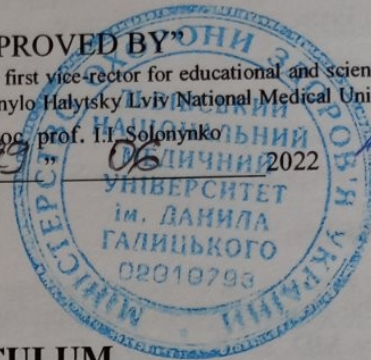
DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY

Department of General Hygiene and Ecology

“APPROVED BY”

the first vice-rector for educational and scientific work
Danylo Halytsky Lviv National Medical University
assoc. prof. I.I. Solonynko

2022



CURRICULUM

ON DISCIPLINE

HYGIENE IN PHARMACY AND ECOLOGY

For preparation of specialists of the second (master's) level of higher education

English-speaking students

Branch of knowledge 22 "Healthcare"

Specialty 226 "Pharmacy, industrial pharmacy"

(full-time education)

Discussed and approved

at the methodical meeting of the department

general hygiene with ecology

Minutes № 23

from "09" June 2022

Head of Department

prof. V.I. Fedorenko

Approved

profile methodical commission

on preventive medicine

Protocol № 4

from "09" June 2022

Chairman of the profile methodical

commission

prof. V.I. Fedorenko

2022

PROGRAM DEVELOPERS:

Professor V.I. Fedorenko,
Associate Professor N.V. Moskvjak,
Associate Professor L.M. Kitsula.
Associate Professor A.V.Sybirnyy.

REVIEWERS:

Head of the Department of Microbiology, Danylo Halytsky Lviv National Medical University, MD, Professor O.P. Korniychuk.

Head of the Department of Social Medicine, Economics and Health Organization of Lviv National Medical University named after Danylo Halytsky, Candidate of Medical Sciences, Associate Professor T.G. Gutor.

The program of study of the discipline "Hygiene in Pharmacy and Ecology" drawn up in pursuance of Order № 884-c of 15.03.2022 "On the implementation of the curriculum for the preparation of applicants for the second (master's) level of higher education in the specialty" 226 Pharmacy, industrial pharmacy in the field of knowledge 22 Health ", according to Education -professional program "Pharmacy, Industrial Pharmacy" of the second (master's) level of higher education approved by the Academic Council of Lviv National Medical University named after Danylo Halytsky 17.02.2021, protocol № 1-VR. as well as the requirements of the "Regulations on the working curriculum of the discipline", developed at the Lviv National Medical University named after Danylo Halytsky and approved by the Central Methodological Commission (Minutes № 2 of April 23, 2015).

Description of the discipline (abstract)

"Hygiene in Pharmacy and Ecology" as a discipline is studied by masters of the specialty "Pharmacy" in the second year of full-time and part-time forms of education. The course lays the foundations for understanding the importance of preventive medicine and environmental protection for maintaining and promoting public health. Study of the basics of hygiene and ecology, special issues of hygiene of pharmacies and pharmaceutical companies, as well as environmental issues related, in particular, to the production of drugs, future masters of pharmacy need to understand the patterns of environmental impact on individual and population health. working conditions, organization and observance of sanitary-hygienic and anti-epidemic regime in pharmacies and pharmaceutical enterprises, development and implementation of preventive measures to preserve health and environmental protection.

The discipline consists of two content modules. 90 hours (3 credits) are allotted for its study.

The structure of the discipline	Number of credits, hours, of them				Year of study, semester	Type of control
	Total	Classroom		Self educational work		
		Lectures	Practical classes			
Subjects: Hygiene in pharmacy and ecology Content modules 1-2	3 credits / 90 hours	10	20	60	2 kypc (4 semester)	credit

The subject of study of the discipline is the hygienic assessment of the impact of factors of the production environment of pharmacies and pharmaceutical companies and environmental factors on the health of workers and the population, preventive measures to preserve health and environmental protection.

Interdisciplinary links: general, inorganic, organic, pharmaceutical and toxicological chemistry, biological physics, physical and colloid chemistry, physiology, microbiology with the basics of immunology, extreme medicine and civil defense, pathological

physiology, pharmacy technology of medicines and industrial technology means, labor protection in the field, good practices in pharmacy.

1. The purpose and objectives of the discipline

1.1. The purpose of teaching the discipline "Hygiene in Pharmacy and Ecology" is: mastering future masters in "Pharmacy" theoretical knowledge in the field of hygiene, including hygiene of pharmacies and pharmaceutical companies, and ecology, mastering practical skills to change preventive measures human health and protection of the environment from pollution in order to apply the acquired knowledge and skills in their practical professional activities.

1.2. The main objectives of the discipline "Hygiene in Pharmacy and Ecology" are:

- awareness of the priority of preventive measures to improve the health of individuals and populations;
- mastering the knowledge and skills of sanitary and hygienic assessment of the production environment of pharmacies and pharmaceutical companies, environmental and hygienic assessment of the environment;
- mastering the practical skills of organizing effective preventive work necessary for the performance of professional duties, and their application in practice.

1.3. Competences and learning outcomes, the formation of which is facilitated by the discipline (relationship with the normative content of higher education training, formulated in terms of learning outcomes in the Standard).

In accordance with the requirements of the Standard of Higher Education, the discipline provides students with the acquisition of competencies:

- *integrated*: the ability to solve typical and complex specialized problems and practical problems in professional pharmaceutical activities using the provisions, theories and methods of basic, chemical, technological, biomedical and socio-economic sciences; integrate knowledge and solve complex issues, formulate judgments on insufficient or limited information; clearly and unambiguously communicate their conclusions and knowledge, reasonably substantiating them, to professional and non-professional audience;

- *general*:

- ability to act socially responsible and civic conscious;
- ability to apply knowledge in practical situations;
- the desire to preserve the environment;
- ability to abstract thinking, analysis and synthesis; ability to learn and be modernly trained;
- knowledge and understanding of the subject area and understanding of the profession;
- ability to adapt and act in a new situation;
- ability to communicate in the native language both orally and in writing, ability to communicate in a foreign language;
- skills of using information and communication technologies.

- *special (professional, subject):*
- ability to organize and participate in the production of medicines in the conditions of pharmaceutical enterprises, including the choice of technological process with justification of technological process and selection of appropriate equipment in accordance with the requirements of Good Manufacturing Practice (GMP);
- ability to organize and control the quality of medicines in accordance with the requirements of the State Pharmacopoeia of Ukraine and good practices, determine sampling methods for control of medicines in accordance with current requirements and conduct their certification, prevent the spread of counterfeit medicines;
- ability to ensure proper storage of medicines and medical devices in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP) in health care facilities;
- ability to conduct sanitary and educational work among the population to prevent common diseases of internal organs, prevent dangerous infectious and parasitic diseases, as well as to facilitate the timely detection and maintenance of adherence to treatment of these diseases according to their medical and biological characteristics and microbiological characteristics.

Detailing of competencies according to NQF descriptors in the form of “Competence Matrix”.

Competence matrix

Competence	Knowledge	Skills	Communication	Autonomy and responsibility
Integral competence				
Ability to solve typical and complex specialized problems and practical problems professional pharmaceutical activity with the use of regulations, theories and methods basic, chemical, technological, biomedical and socio-economics sciences; integrate knowledge and solve complex problems, formulate judgments on insufficient or limited information; clearly and unambiguously communicate their conclusions and knowledge, reasonably them substantiating, to professional and non-professional audience.				
General competencies				
GC 1. Ability to act socially responsible and civic conscious	Know your social and community rights and responsibilities	To form one's civic consciousness, to be able to act in accordance with it	Ability to convey one's public and social position	Be responsible for your civic position and activities
GC 2. Ability to apply knowledge in practical situations	Know the methods of realization of knowledge in solving practical problems	Be able to use professional knowledge to solve practical situations	Establish links with practitioners	Be responsible for the timeliness of decisions
GC 3. The desire to preserve the environment	To know the problems of preservation of the former environment, the requirements of the sanitary-hygienic regime and the conditions of labor protection	Be able to form requirements for the preservation of the former environment, compliance with sanitary and hygienic regime and labor protection conditions; to interpret the requirements of legislative and regulatory acts on	Develop measures to preserve and protect the environment	Be responsible for the implementation of environmental protection measures within its competence

		labor protection; draw conclusions about the presence of harmful factors in the performance of professional duties; to ensure the protection of the work of pharmaceutical staff		
GC 4. Ability to abstract thinking, analysis and synthesis; ability to learn and be modernly trained	Know the current trends in the industry and analyze them	Be able to analyze professional information, make informed decisions, acquire modern knowledge	Establish appropriate connections to achieve goals	To be responsible for the timely acquisition of modern knowledge
GC 6. Knowledge and understanding of the subject area and understanding of the profession	Know the structure and features of professional activity	Be able to carry out professional activities that require updating and integration of knowledge	To form a communication strategy in professional activity	To be responsible for professional development with a high level of autonomy
GC 7. Ability to adapt and act in a new situation	Know the elements of industrial and social adaptation; factors of successful adaptation to the new environment	Be able to form an effective strategy of personal adaptation to new conditions	Interact with a wide range of people (colleagues, management, specialists from other industries) in the event of new situations with elements of unpredictability	Be responsible for making decisions
GC 8. Ability to communicate in one's native language both orally and in writing, ability to communicate in a second language	Have a perfect knowledge of the native language and basic knowledge of a foreign language	Be able to apply knowledge of the native language, both orally and in writing, be able to communicate in a foreign language	Use your native language in professional and business communication and in the preparation of documents. Use a foreign language in professional activities	To be responsible for fluency in the native language, for the development of professional knowledge
GC 9. Skills in the use of information and communication technologies	Have deep knowledge in the field of information and communication technologies used in professional activities	Be able to use information and communication technologies in a professional field that requires updating and integration of knowledge	Use information and communication technologies in professional activities	Be responsible for the development of professional knowledge and skills
Special (professional) competencies				
PC 1. Ability to conduct sanitary and educational work among the population in order to prevent common diseases of internal organs, prevent dangerous infectious and parasitic diseases and to facilitate the timely detection and maintenance of adherence to treatment	Know the environmental factors and endogenous factors that contribute to the spread of diseases of internal organs, dangerous infectious and parasitic diseases	Organize scientific and practical seminars for medical staff and lectures for the population on the rational use of drugs, medicinal plant raw materials, the harmfulness of drug and potent drug abuse, measures to prevent drug dependence	Carry out systematic preventive work and take anti-epidemic measures to prevent infectious diseases	To be responsible for the quality and timeliness of preventive and anti-epidemic measures

of these diseases in accordance with their medical and biological characteristics and microbiological features				
PC 7. Ability to ensure the proper storage of medicinal products and medical devices in accordance with their physicochemical properties and the rules of Good Storage Practice (GSP) in health care facilities	Know the general requirements for the storage of medicines in pharmacies	Provide appropriate storage conditions for medicines; to control the conditions of storage of raw materials at pharmaceutical enterprises	Carry out constant monitoring of proper storage of medicines and medical devices at pharmaceutical enterprises	Responsible for the storage of medicines and medical devices in accordance with Good Storage Practice (GSP) in healthcare facilities
PC 15. Ability to organize and participate in the production of medicines in the conditions of pharmaceutical enterprises, including the choice of technological process with the justification of the technological process and the choice of appropriate equipment according to with Good Manufacturing Practice (GMP) requirements	Know: technology of medicines of industrial production; GMP requirements and other good pharmaceutical practices	Choose the optimal technology for the manufacture of dosage forms, using the necessary equipment	Choose the optimal technological process for the manufacture of industrial drugs	Responsible for compliance with Good Manufacturing Practice
PC 19. Ability to organize and control the quality of medicines in accordance with the requirements of the State Pharmacopoeia of Ukraine and good practices, determine the methods of sampling for control of medicines in accordance with current requirements and certify them, prevent the spread of counterfeit medicines	Know: methods of analysis and research of air on dust content; water hygiene and water supply; cleaning, reprocessing and disposal of industrial waste	Take samples for the analysis of wastewater, gaseous emissions into the atmosphere, liquid and solid waste for the content of harmful substances and draw up the results of the analysis, keep records and map the exceedances of the MPC	Carry out quality control of medicines and their certification	Responsible for certification and prevention of the spread of counterfeit medicines

Learning outcomes:

Program and integrative final learning outcomes, the formation of which is facilitated by the discipline:

- to carry out professional activities in social interaction based on humanistic and ethical principles; identify future professional activities as socially significant for human health **(PLO 1)**;

• apply knowledge of general and professional disciplines in professional activities **(PLO 2)**;

- adhere to the norms of sanitary and hygienic regime in carrying out professional activities (**PLO 3**);
- to conduct sanitary and educational work among the population in order to prevent common non-communicable diseases, prevention of infectious and parasitic diseases (**PLO 13**);
- analyze the state of the environment and the impact of its factors on public health;
- to interpret the general laws of the connection of health with the factors and conditions of the living environment;
- have methods of hygienic assessment of physical, chemical, microbiological factors of the production environment and the environment and their impact on human health;
- to carry out hygienic assessment of modern technological processes in the pharmaceutical industry;
- justify measures to improve working conditions and prevent pollution of the biosphere;
- to determine the risk factors for major diseases in employees of pharmacies and the pharmaceutical industry, which are related to the conditions of the production environment and technological processes;
- substantiate hygienic measures for the prevention of infectious, ecologically conditioned and ecologically dependent diseases of non-infectious origin;
- plan measures to maintain a healthy lifestyle, personal hygiene and implement them in pharmacies and in the pharmaceutical industry;

Learning outcomes for the disciplines: pharmaceutical and toxicological chemistry, pharmaceutical technology of medicines, industrial technology of medicines and cosmetics, labor protection in the field, good practices in pharmacy.

2. Information volume of the discipline

90 hours (3 ECTS credits) are allotted for the study of the discipline.

Thematical module 1. General issues of hygiene and ecology

Topic 1. Hygiene as a science. Ecology as a science. Environmental impact on Health.
Sanitary and environmental legislation (*lecture*).

Hygiene as a science, its purpose, task, content, connection with other sciences. Prophylactic orientation of domestic medicine, public and personal prevention, primary, secondary and tertiary, priority priorities. Hygiene in pharmacy as a part of hygienic science. The importance of hygiene for the formation of professional thinking and practical activity of masters in the specialty "Pharmacy". Fundamentals of hygiene methodology: general philosophical laws and categories, their use in hygiene. Laws (postulates) of hygiene, their essence. Definition and interpretation of concepts: health, illness, health, environment, environmental factors. Methods of hygienic research, their classification. Empirical, scientific-experimental and modern stages of the formation and development of hygiene. Development of hygienic science in Ukraine.

Subject, task, structure of modern ecology. Concepts and terms: ecology, biosphere, noosphere, biogeocoenosis, biosystem, population, abiotic and biotic factors, adaptation.

Communication of ecology with medical disciplines, in particular with hygiene, biology, physiology. Basic ecological laws and methods of ecology. The value of environmental education for the master's degree in pharmacy. Emergence and stages of ecology development. The modern period of ecology formation. Achievements of the national science in the field of ecology.

Influence of environmental factors on individual and population health. Monitoring of the environment.

Sanitary and environmental legislation of Ukraine, its importance for the implementation of preventive measures. The concept of hygienic and environmental regulation. Regulatory bases of environmental protection and health. International cooperation in the field of environmental protection.

Topic 2. Hygienic value of atmospheric air, water and soil. Sources of environmental pollution and environmental problems .

Hygienic value of physical factors of atmospheric air (solar radiation, temperature, humidity, direction and velocity of air, atmospheric pressure), weather and climate. The structure of the atmosphere. The natural chemical composition of the atmospheric air, its physiological role and hygienic significance.

The structure of the hydrosphere. World stocks of water. Water as an environmental factor, its physiological, hygienic and economic importance. Sources of water supply, their comparative hygienic characteristics. Water as an etiological factor of diseases of an infectious and non-infectious nature.

The structure of the lithosphere. Soil as an environmental factor and its hygienic value. The role of soil in the emergence and spread of infectious diseases and invasions. Biogeochemical provinces and endemic diseases.

The main sources of environmental pollution. The main chemical pollutants of the environment (pesticides, heavy metals, polychlorinated biphenyls, dioxins, sulfur oxides, nitrogen, carbon, etc.). Air pollution by emissions from vehicles. Influence on the environment of thermal and hydroelectric power plants, gas and dust emissions of industrial enterprises. The notion of the greenhouse effect, smog, acid rain and the ozone layer of the atmosphere. Sources of environmental pollution by medical and pharmaceutical waste, classification of waste by hazard classes. Influence of military activity on the environment.

Measures for the protection of atmospheric air, sources of water supply and drinking water, soil. Concept about sanitary-protective zones of industrial enterprises, zones of sanitary protection of water sources. Methods of disposal and utilization of solid domestic and industrial waste. Ways of sewage treatment. Ways of disposal and utilization of medical products, medical and pharmaceutical waste.

Topic 3. Research methods in hygiene. Hygienic assessment of the microclimate of the premises.

Methods of hygienic research: methods of studying the state of the environment and its hygienic assessment, methods of studying the environmental impact on health.

Microclimate, its components, influence on body heat transfer, heat transfer paths. Hygienic norms of microclimate parameters (temperature, humidity, air velocity, radiation temperature) of pharmacies, pharmaceutical enterprises, medical and preventive establishments, public and residential premises. Hygienic value of atmospheric pressure. Hygienic estimation of spatial temperature regime of premises, humidity, radiation temperature, devices. Changes in the state of health and diseases that arise as a result of the influence on the human body of a heating and cooling microclimate. Ways to optimize the climate of the premises. Hygienic value of heating, its kinds.

Sources of infection with acute respiratory disease COVID-19 caused by coronavirus SARS-COV-2 and features of the spread of the pathogen among humans. Measures of general and individual prevention of coronavirus infection.

Topic 4. Hygienic estimation of direction and speed of air movement. Determination of the effectiveness of natural and artificial ventilation of premises.

The concept of "rose of the wind" and its hygienic significance. Hygienic estimation of air speed in premises of pharmacies, pharmaceutical enterprises, medical and preventive establishments, public and residential premises, devices.

The value of individual components of human exhaled air. Hygienic value of carbon dioxide as an indirect indicator of anthropogenic air pollution of premises, air oxidation, principles of methods of determination, hygiene norms.

Ventilation of premises, its kinds and hygienic value. Air conditioning. The concept of the air cube, the required and actual volumes and multiplicity of ventilation. Calculation of the efficiency of indoor ventilation and their hygienic assessment. Norms of the frequency of air exchange in premises of different purposes. Connection between volume and multiplicity of ventilation and scientific substantiation of norms of living space.

Topic 5. Hygienic estimation of natural, artificial lighting of premises and ultraviolet radiation.

Hygienic value of natural and artificial lighting of pharmacy premises, pharmaceutical enterprises, medical and preventive establishments, public and residential premises. Artificial lighting of premises, its kinds. Indicators of the natural (light ratio, the angle of incidence of light rays in the workplace, the angle of the hole, the coefficient of natural light) and the artificial illumination of the premises, hygienic standards for premises of different purposes. The principle of operation of a luxmeter. Calculated method for studying artificial illumination. Effect of excessive and insufficient illumination on the visual analyzer, functional state of the central nervous system, human capacity.

Hygienic value of ultraviolet radiation of the Sun, its spectrum on the Earth's surface. Biogenic and abiogenic effects of ultraviolet radiation. Methods of research and evaluation of ultraviolet radiation. The concept of biodose, optimal and preventive dose of ultraviolet radiation. The use of artificial sources of ultraviolet radiation for the rehabilitation of the premises of pharmacies, pharmaceutical enterprises and treatment and prophylactic establishments.

Topic 6. Hygienic assessment of the influence of climatic and weather conditions on

human health. Helioometotropic reactions and diseases.

Weather, weather forming conditions and weather characterizing conditions. Types of atmospheric circulation: anticyclones, cyclones, atmospheric fronts. Medical weather classifications. Effect of weather on human health (direct and indirect).

The climate, its hygienic significance, classification. Climate-forming and climatic characterizing factors and indicators. Climate zones of Ukraine. Spa therapies and Climatotherapy. Acclimatization as a complex social and hygienic process.

Method of hygienic estimation of direct and indirect influence of climate and weather on human health. Helioometotropic reactions and helio-metotropic diseases, their prophylaxis.

Topic 7. Hygienic requirements for drinking water and its hygienic evaluation on the results of laboratory analysis of samples. Methods of improving the quality of drinking water.

Hygienic requirements for the quality of drinking water intended for human consumption . Indicators of epidemic (microbiological and parasitological), sanitary-chemical (organoleptic, sanitary-chemical and toxicological) and radiation safety, indicators of the full value of the mineral composition of drinking water, their hygienic value. Assessment of drinking water quality in a set of indicators.

Methods of water purification: basic (settling, coagulation, filtration) and special (non-ironification, softening, desalination, fluoridation, depletion, deodorization, decontamination, degassing, etc.). Physical and chemical methods of disinfection of water, their hygienic value. Comparative hygienic characteristic of methods of chlorination of water. Chlorination of water with normal doses (for chloroprime) and hyperchlorination. Hygienic value and principle of determination of residual chlorine in tap water.

Topic 8. Sources and types of water supply. Infectious and non-infectious diseases transmitted through water, their prophylaxis.

Hygienic, physiological and economic value of water. Water supply standards for covering physiological, communal, economic and industrial needs. Sources of water supply, their types, comparative hygienic characteristics, pollution routes and their consequences for public health. Self-cleaning of reservoirs. Centralized and decentralized water supply systems for populated areas, their comparative hygienic characteristics.

Classification of infectious diseases transmitted through water. Signs of water epidemics. The role of water in the emergence of non-infectious diseases (water-nitrate methemoglobinemia, lead intoxication, caries, fluorosis, etc.). Measures for the prevention of infectious and non-infectious diseases with water transmission.

Topic 9. Hygienic and ecological significance of the soil. Sanitary cleaning of populated places.

Hygienic and ecological significance of the soil. Classification of soils by mechanical composition. Physical properties of the soil: porosity, filtration ability, moisture content, hygroscopicity, capillarity, their hygienic value. Sources of soil pollution. Indicators of the sanitary state of the soil: epidemic (chemical, microbiological, helminthological,

entomological), chemical and radiation safety, physical, physical and chemical. Self-cleaning of soil. Hygienic assessment of the sanitary state of the soil by a set of indicators. Soil as a factor in the transmission of pathogens of infectious diseases and the spread of invasions. Geochemical factors of the spread of endemic diseases.

Systems of clearing of inhabited places, hygienic characteristic of methods of clearing from liquid and solid wastes. Modern hygienic and bioethical problems of settlement of inhabited places.

Topic 10. Nutrition and health. Scientific fundamentals of rational nutrition. Nutrition in environmentally unfavorable environments. Features of the interaction of nutrients and medicines.

The value of proteins, fats, carbohydrates, vitamins, minerals in the diet of a healthy and sick person. Theories of nutrition, functions of food and types of nutrition. Principles of rational nutrition. Hygienic requirements for rational nutrition. Physiological norms of energy consumption and basic nutrients for different groups of the population of Ukraine. Features of nutrition for children and the elderly. Hygienic requirements for daily diet and regime of diet. Indices of hygienic assessment of the quality of the diet. Means of medical control of nutrition of different population groups. Alimentary and alimentary-dependent diseases, their prophylaxis.

The main sources of nutrients and energy. The problem of food contamination with chemicals and the organization of preventive measures. Interaction of nutrients and medicines. Effect of food on absorption of medicinal substances, their therapeutic effect and metabolism. Influence of medicinal substances on the processes of absorption of nutrients in the digestive tract.

Topic 11. Method of calculation of human energy consumption and its needs in the basic nuclei. Hygienic assessment of food status.

Energy expenditure of the organism, components of daily energy consumption and energy balance of the person. Groups of physical activity of the able-bodied population of Ukraine. The concept of the coefficient of physical activity. Standards of physiological needs in energy and basic nutrients of different population groups of Ukraine (1999). Method of determination of average daily energy consumption by calculated methods (WHO, 1986) and individual needs for basic nutrients and energy. Features of the determination of daily energy needs and the basic elements of children and the elderly.

The concept of the nutritional status of the organism. Methodology for studying and assessing the food status. Vitamin deficiency, microelementosis, causes of their occurrence, prevention. Criteria for assessing energy and vitamin nutrition adequacy

Topic 12. Prevention of food poisoning.

The concept of quality and safety of food products. Microbiological criteria for food safety, microbiological standards. The concept of residual quantities of chemicals in foods. Food poisoning. Classification of food poisonings of microbial and non-microbial etiology, causes of their occurrence. Method of investigation of cases of food poisoning. Basic principles of prevention of food poisonings of microbial and non-microbial origin.

Topic 13. Biosphere, origin and evolution. Ecological systems: structure, classification, functioning. Structure of the socioecosystem.

A general idea of the biosphere, its origin and evolution. Characteristics of the components of the biosphere (atmosphere, hydrosphere, lithosphere). The structure of the atmosphere, the environmental significance of the atmosphere. Chemical and physical properties of the hydrosphere, water resources of the planet. Structure, chemical and physical properties of the lithosphere, its function.

Functioning of the biosphere. The first and second laws of thermodynamics. The concept of entropy. Teaching of Academician V.I. Vernadsky on the biosphere and the noosphere. Ecological system, definition, characteristic. Signs of the ecological system. Classification of ecosystems. Basic ecosystems of the biosphere. Features of the formation of water, air, terrestrial ecosystems. Flow of energy and substances in ecosystems. Autotrophic and heterotrophic organisms. Biogeocoenosis as an elementary ecosystem of the biosphere. Energy and productivity of biogeocoenosis. Development and evolution of ecosystems. The main types of environmental pyramids. The concept of urbose ecosystems and socioecosystems. Structure of the socioecosystem.

Topic 14. Energy and material flows in ecological systems. Biogeochemical cycles.

Ecological system, definition, characteristic. Classification of ecosystems. Basic ecosystems of the biosphere. Features of the formation of water, air, terrestrial ecosystems. Biogeochemical cycles, their ecological significance. Flow of energy and substances in ecosystems. Biogeochemical cycle of substances (carbon, nitrogen, phosphorus, oxygen, hydrogen, sulfur, potassium, magnesium, calcium). The cycle of trace elements (iodine, selenium, fluorine, etc.). Features of the cycle of heavy metals (lead, cadmium, mercury). Influence of anthropogenic and technogenic factors on the cycle of substances.

Topic 15. Ecology and health. General patterns of human adaptation to different environmental conditions. Ecologically conditioned and environmentally dependent diseases.

Human ecology in different climatic conditions. Acclimatization. The notion of biorhythms. Biorhythmology. The general laws of adaptation of the human organism to different environmental conditions. Stress, Eustress, Distress.

Urboecology. Urbanization, its positive and negative aspects. The degradation of the biosphere in large cities. Housing Ecology. Planting of cities.

Pollution of the environment and human health. The role of environmental factors in the formation of human health. Human health as an integral indicator of the state of the environment. Influence of abiotic, biotic and anthropogenic factors on human health and life expectancy. Demographic Problems of Ukraine. Concepts of ecologically and environmentally dependent diseases. The state of health of the population of Ukraine in connection with pollution of the environment.

Topic 16. Methods of environmental protection from energy pollution (noise, vibration, electromagnetic fields).

Sources of noise and vibration (aviation, rail, water, road transport, urban electric transport, industrial facilities, power plants, loudspeakers, elevators, household appliances, etc.). Electromagnetic pollution, its sources (radio, television, radar stations, high-voltage transmission lines, etc.). Measures for protecting the environment from harmful effects of noise (planning measures, organization of sanitary protection zones, sound absorption means, green plantings, etc.), vibrations (planning measures, rational exploitation of vibration sources, vibration isolation and vibration dampers), electromagnetic fields (planning measures, organization of sanitary- protective zones, shielding sources, grounding, facing of building constructions, etc.).

Topic 17. Radiation Hygiene. Hygienic problems of radiation protection of workers with sources of ionizing radiation and radiation safety of the population.

Radiation hygiene as a branch of radiation medicine and hygiene. Ionizing radiation, their classification. The notion of radioactivity, radionuclide, isotopes, types of nuclear transformations. Qualitative and quantitative characteristics of radionuclides and ionizing radiation. The notion of activity of radionuclides, doses of ionizing radiation (absorbed, exposure, equivalent, effective).

Sources of ionizing radiation (radionuclides are closed and open and non radionuclide). The concept of external and internal radiation. Natural radiation background.

Biological action of ionizing radiation (stochastic and non-stochastic effects). Consequences of the accident at the Chernobyl Nuclear Power Plant.

Hygienic regulation of ionizing radiation. Basic radiation and hygiene regulations according to "Norms of radiation safety of Ukraine" (NRSU-97). "Basic sanitary rules of radiation safety of Ukraine" (2005).

Radiation protection and radiation protection. Principles of protection (time, distance, number, screen). The complex of radiation protection measures.

Topic 18. Ecological situation in Ukraine. Ecological, hygienic and medical and social consequences of the accident at the Chernobyl Nuclear Power Plant.

Pollution of atmospheric air, water objects and soil in Ukraine. Zoning of the territory of Ukraine by degree of pollution.

Chernobyl accident. Scale of environmental pollution as a result of the accident. Exclusion zones, guaranteed voluntary resettlement, reinforced and periodic radioactive control, legal regime in them. The content of radioactive substances in food and drinking water, their permissible levels.

Influence of radiation pollution on flora and fauna, general and oncological morbidity of the population.

Topic 19. Pesticides, agrochemicals and biosecurity of the population.

Concepts of pesticides and agrochemicals. Classifications of pesticides by chemical structure and purpose. Hygienic classification of pesticides by degree of danger. Mineral macro- and microfertilizers. Ways of migrating pesticides in the environment. Receipt of pesticides and components of mineral fertilizers into the body. Impact of pesticides and

agrochemicals on the environment and public health. Long-term effects of pesticides. Contamination of soil and water sources with components of nitrogen fertilizers.

The essence of the concept of integrated hygienic regulation of pesticides and the uniform hygienic regulation of nitrates in water and food products. The concept of the permissible daily dose and permissible daily intake, the maximum allowable level (MAL) of pesticides in food products and the acceptable level (AL) of nitrates in plant products.

Requirements for pesticides and agrochemicals taking into account environmental biosecurity. The main directions of solving the problem of pollution of the biosphere with pesticides and agrochemicals.

Topic 20. Biotechnology. Genetic engineering. Potential danger of widespread introduction of biotechnology.

Definition of the concept of biotechnology. Stages of development, priority tasks. Biotechnology methods. Use of biotechnology in the pharmaceutical industry (manufacturing of medical enzymes, antibiotics, interleukins, hormones, vaccines). Microbiological synthesis. Genetic engineering, definition of the concept. Basic principles of genetic engineering. The concept of genetically modified organisms and products, their benefits and disadvantages. Potential danger of widespread introduction of biotechnology. Consequences of the influence of biological agents and biotechnological products on the environment and human health. Legislative regulation of food safety in the European Union and Ukraine.

Topic 21. Negative consequences for the human body of a wide introduction of computer technology and mobile telephony.

The main negative factors when working with a computer and using a mobile phone, their influence on bioelectric activity of the brain, visual analyzer, endocrine and immune systems, indicators of attention, sleep. Requirements for the organization of the workplace and the working position when working with the computer. Hygienic rules for computer users and mobile phones.

Topic 22. Natural and anthropogenic disasters.

Definition of disasters and accidents. Classification of disasters according to conditions, speed of occurrence and development. Definition of natural disasters (flooding, earthquakes, mud slides, fires, hurricanes, etc.) and anthropogenic (technogenic) disasters. London and Los-Angeles smogs. Chemically unsafe sites. Chemical disasters, Chernivtsy' disease. Toxic food poisonings (Minamata's disease, Itay-Itay, Jusho's disease, Ju-Cheng and others). Radiation and nuclear disasters. Using radioactive, chemical and pathologic bio-agents with terrorist aims.

Human factor role in technogenic catastrophes. Ecological and medical disaster consequences. International and national organizations for liquidation of consequences of natural, technogenic and social catastrophes.

Topic 23. Sanitary and hygienic measures in the period of wartime and in emergency situations of peacetime.

Identification and classification of emergencies. Sanitary and hygienic measures to be taken during emergencies and disasters of peacetime. The concept of "personal" and "social" (collective) hygiene. The basic directions of work of sanitary-hygienic service in areas of disasters and natural disasters. Hygienically significant objects in areas of disasters and natural disasters that must be under constant control. Hygienic requirements for accommodation of evacuated population.

The content of the concept of "sanitary supervision" in the Armed Forces. Hygienic support of the military unit. Features of organization and carrying out sanitary-hygienic measures during wartime. Hygienic requirements for fortification buildings. Hygienic criteria for the proper use of military repositories. Hygienic requirements for accommodation of evacuated population.

Bath-washing troops service. Hygienic requirements for the removal and disinfection of garbage and impurities. Sanitary cleaning of the field of combat and disaster areas. The order of gathering and burial of the dead. International and national structures that provide aid for disasters victims and liquidate disasters' consequences. Hygienic requirements for placement, food and water provision in a disaster setting. Principles of organization and conduction of sanitary inspection of field accommodation, water and food provision and working conditions of disasters liquidators and military units.

Topic 24. Military action as pollution factor.

Ecologically unsafe military sites. Sources and ways of chemical pollution of soil, water, atmospheric air, energetic pollution. Ecological changes due to military action during peace and war time. Ecosystem ecological weapons. Ecocide and its consequences. Environmental consequences of nuclear, chemical, and bacteriological weapons use.

Topic 25. Hygienic foundations of the healthy lifestyle, personal hygiene. Foundations of psychohygiene. Sanitary education and hygienic education of general public.

The concept of the healthy way of living. Importance of physical training for human health. Principles and methods of body tempering. Harmful effects of active and passive smoking, alcohol consuming, drugs use, ways of prevention.

Personal hygiene, its importance for preservation and improving of health. Main elements of personal hygiene: rational time management, work-rest balance, sleep, nutrition, working out, body tempering, hygiene of body, hair, oral cavity, hygiene of clothes and foot wear.

Detergents: soap, detergents, their classification, hygienic characteristics. Hygienic requirements for synthetic detergents (SMD). Toxicological, hygienic and microbiological indicators of perfume and cosmetics industry products.

The concept of psychohygiene, its goals. Psychological foundations of every-day life optimization. The concept of mental health and criteria of its estimation.

The role, goals, methods and means of sanitary education. Organization and forms of sanitary education. Sanitary educational work in professional activity of provisors.

Module 2. Hygiene of pharmacies and chemical pharmaceutical plants.

Topic 26. Hygienic requirements for pharmacies and pharmaceutical plants, hygienic regimen of their operation.

Main types of pharmaceutical institutions. Principles of pharmacies and pharmaceutical plants positioning in cities, main requirements for the land lot. Main hygienic requirements for planning of pharmacies, pharmaceutical warehouses, control-analytical laboratories and pharmaceutical plants. Hygienic requirements for internal planning and sanitary-technical equipment of pharmacies (ventilation, heating, illumination, water supply and sewage system, hard waste disposal). Hygienic norms of microclimate parameters, ventilation rate, insolation regimen, natural and artificial illumination of pharmacies.

Topic 27. Hygienic estimation of location, planning, layout, sanitary and technical equipment, sanitary-hygienic and antiepidemic regimens in pharmacies.

Typical construction project, its main parts (explanatory note, general plan, architectural and construction drawings), situational plan. Hygienic requirements for the land lot of a pharmacy. Groups, content and minimal area of different types of pharmacies. Scheme of positioning of the main structural parts of a pharmacy. Equipment placing. Hygienic requirements for internal planning of the aseptic compound of a pharmacy. Aspects of technologic process of medicine preparation and distribution in a pharmacy. Requirements for the regimens in pharmacies: sanitary-hygienic (temperature, humidity, air velocity, ventilation rate, natural and artificial illumination, water supply), and sanitary-antiepidemic (rooms cleaning, personal hygiene of the staff, preparation of non-sterile medicine forms in aseptic conditions).

Topic 28. Hygienic assessment of microbiologic, dust and chemical pollution of the air of pharmacies.

Sources of air pollution in pharmacies, main pollutants. Microbial contamination of air. Conditions and methods of air sampling for microbiological assessment (sedimentation, filtration, aspiration with Krotov's device). Bacteriological requirements for the air in pharmacies. Parameters of clean air and methods of air sanitation.

Dust, its classification according to origin, chemical composition, dispersion. Fibrogenic, allergenic, irritating and other types of harmful effects of dust on human body, prophylaxis of dust pathology. Methods of sampling and evaluation of dust content in the air. Hygienic norms for dust in the air of a pharmacy.

Main chemical pollutants (volatile medicines, washing and disinfecting liquids, etc.), their impact on the personnel. Methods of sampling and evaluation of gases and vapours content in the air of a pharmacy, hygienic norms.

Topic 29. Foundations of occupational hygiene. Hygienic classification of occupations. Occupational hazards and professional diseases. Occupational hygiene at pharmaceutical plants and in pharmacies (lecture).

Occupational hygiene, its goals and tasks. Work and labor – definitions. Physiology of work, physiologic changes associated with working, exertion and overexertion, ways of prevention. Hygienic classification of labor, classification criteria. Classes of conditions and process of labor. Ergonomics.

Occupational hygiene at pharmaceutical plants. Occupational hazards, professional diseases (specific and non-specific) and poisonings (acute and chronic). Industrial dust, its classification. Non-specific effects of medicine aerosol in pharmacies and at pharmaceutical plants. Medicines as industrial poisons. Changes of general resistance due to prolonged contact with medicines in pharmacies and at pharmaceutical plants. Cancerogens, mutagens, allergens in medicines production, prevention of their effects on the personnel. State hygienic directive "The List of Carcinogenic Substances and Industrial Processes". Medicines that commonly cause allergic reactions (antibiotics, novocain, sulphanilamides, salycillates). Ways of prevention of chemical substances, particularly medicines, hazardous effects on the human body. Maximum allowed concentrations of hazardous substances in the air of the working zone.

Impact of noise, vibration, and electro-magnetic fields of different frequency on the personnel. Physical characteristics of noise, vibration, and electro-magnetic fields. Ways of prevention of harmful effects of noise, vibration, and electro-magnetic fields. Maximal allowed levels of noise, vibration, and electro-magnetic fields at industrial objects.

Impact of forced working posture, overexertion of certain organs and systems, monotonous labour, ways of prevention.

Topic 30. Conditions and nature of labour of the personnel in pharmaceutical industry and pharmacies; prevention of occupational diseases.

Influence of the process and conditions of labor on health and efficiency of the personnel of pharmaceutical plants and pharmacies. Estimation of working conditions in pharmaceutical institutions according to work intensity. Occupational hazards at pharmaceutical plants and in pharmacies, their characteristics. Occupational hygiene in the production of synthetic medicines, antibiotics, herbal remedies, tablets, solutions. Occupational morbidity prevention at pharmaceutical plants and in pharmacies, means of individual protection of respiratory organs and skin.

Means and measures of individual protection of pharmacy workers and workers of the pharmaceutical industry from infection with the causative agent of coronavirus infection COVID-19 (theoretical question).

Topic 31. Hygienic norms as a foundation of environment and public health protection.

Hygienic norms: the aims, the types (MACs in the air of working zone, natural water reservoirs, atmospheric air, soil, food products; approximate safe levels of action, allowable amount of toxic substances migration from polymers, MACs of pesticides and nutritional supplements in food products, allowable daily dose and allowable daily intake of hazardous substances in daily nutritional rations). Main principles of hygienic norms development. Features of hygienic norms of the working zone air, atmospheric air, natural water reservoirs, atmospheric air, soil, food products. Hygienic norms of medicines in the atmospheric air and natural water reservoirs. Ecologic norms and directives. Technical directives, maximum allowable levels of atmospheric pollution and pesticides additions into the soil.

Topic 32. Occupational toxicology. Hygienic estimation of hazardous chemical substances. Combined effects of xenobiotics and medicines, prognosis of their impact on human body.

Toxicology as a science. Prophylactic toxicology as a part of hygiene. Scheme of toxicology experiment, concepts of the acute, subacute and chronic experiments. Toxicometry, its main parameters. The concept of toxicokinetics and toxicodynamics. Cumulation, its types. Long-term effects, specific and allergenic effects of xenobiotics and medicines.

The concepts of combined, complex, added effects. Main types of combined effects (antagonism, potentiating, additivity). The formula of added toxicity. Mechanisms of xenobiotics interaction (chemical, physical-chemical, toxicokinetic, toxicodynamic). The concept of inhibitors and inductors of monooxygenase system. Prognosis of combined effect.

Topic 33. Methods of ecologic expertise conduction at pharmaceutical plants.

Aims and main tasks of ecologic expertise, its types. Objects with high ecologic hazard. Ecologic expertise of pharmaceutical plants. Main principles, objects and subjects, stages and procedure of the ecologic expertise. Content of ecological expertise conclusions. The Law of Ukraine "Concerning the Ecologic Expertise" (1995). Methods of calculation of maximal allowable emission and effectiveness of atmosphere protective structures. Methods of calculation of maximal allowable discharge and effectiveness of water protective structures.

Topic 34. Hygienic estimation of contemporary technological processes of synthesis of medicines, antibiotics and herbal remedies.

Main groups of pharmaceutical plants. Hygienic estimation of main contemporary technological processes and raw material used for synthesis of medicines, antibiotics, herbal remedies; occupational hazards at different stages of technologic processes. Hygienic principles of medicines production set up. GMP system. Ways of improving working conditions at pharmaceutical plants.

Topic 35. Environmental pollution with medicines and its impact on public health.

Sources of and ways of entry of medicines into the environment. Concept of pharmacologic pollution. Migration chains of medicines in the environment. The problem of medicines biotransformation. Medicines as a source of heavy metal pollution. Hazards of medicines (antibiotics, hormones, cytostatics, etc.) and chemosynthesizers for different ecosystems. Concepts of photoallergy, phototoxicity, medicines as photosensibilizers. The concept of MAC of certain antibiotics and hormones in milk and meat. Combined effects of medicines in the environment. Ways of environment protection from pharmaceutical pollution.

3. Structure of the academic subject

Names of content modules and topics	Lectures	Practical classes	Self educational work	Individual work
Hygiene in pharmacy and ecology				
Module 1. General concepts of hygiene and ecology				
Topic 1. Hygiene as a science. Ecology as a science. Effects of environment on health. Sanitary and environmental legislation.	2	–	–	–
Topic 2. Hygienic importance of atmospheric air, water and soil. Sources of environmental pollution and problems of environmental protection	2	–	–	–
Topic 3. Methods of hygienic research. Hygienic estimation of microclimate of rooms.	–	2	–	–
Topic 4. Hygienic estimation of the direction and speed of air movement. Determination of natural and artificial ventilation of rooms.	–	2	–	–
Topic 5. Hygienic estimation of natural and artificial illumination of rooms and ultraviolet irradiation.	–	2	–	–
Topic 6. Hygienic estimation of the impact of climate and weather on human health. Heliometotropic reactions and diseases.	–	–	3	–
Topic 7. Hygienic requirements for drinking water and its hygienic evaluation according to the results of laboratory analysis of samples. Methods of improving the quality of drinking water.	–	2	–	–
Topic 8. Sources and types of water supply. Infectious and non-infectious diseases transmitted through water, their prevention.	–	–	3	–
Topic 9. Hygienic significance of soil. Sanitary cleaning of inhabited places.	–	–	3	–
Topic 10. Nutrition and health. Scientific foundations of rational nutrition. Nutrition under the circumstances of unfavorable environment. Peculiarities of interaction of food substances with medicines.	–	–	2	–
Topic 11. Methods of energy expenditure and nutrients requirement calculation. Hygienic estimation of nutritional status.	–	2	–	–
Topic 12. Prevention of food poisonings.	–	–	3	–
Topic 13. Biosphere, its origin and evolution. Ecosystems: structure, classification, functioning. Socio-ecosystem structure.	–	–	2	–
Topic 14. Energy and material streams in ecosystems. Biogeochemical cycles.	–	–	3	–
Topic 15. Ecology and health. General regularities of human adaptation to different environmental conditions. Ecologically caused and ecologically dependent diseases.	–	–	2	–
Topic 16. Methods of environment protection from energy	–	–	3	–

pollution (noise, vibration, electro-magnetic fields).				
Topic 17. Radiation hygiene. Hygienic problems of radiation safety of the staff working with the sources of ionizing radiation; radiation public safety.	–	–	2	–
Topic 18. Ecologic situation in Ukraine. Ecologic-hygienic and medical-social consequences of Chornobyl nuclear disaster.	–	–	3	–
Topic 19. Pesticides, agrochemicals and public bio-safety.	–	–	3	–
Topic 20. Biotechnology. Genetic engineering. Potential hazards of wide use of biotechnology	–	–	3	–
Topic 21. Negative consequences of wide use of computers and mobile phones on the human health.	–	–	3	–
Topic 22. Natural and anthropogenic disasters.	–	–	3	–
Topic 23. Sanitary-hygienic measures during war and emergency situations of peacetime.	2	–	–	–
Topic 24. Military action as pollution factor.	–	–	3	–
Topic 25. Hygienic foundations of the healthy lifestyle, personal hygiene. Foundations of psychohygiene. Sanitary education and hygienic education of general public.	–	–	3	–
Total in module 1	6	10	47	–
Module 2. Hygiene of pharmacies and chemical pharmaceutical plants.				
Topic 26. Hygienic requirements for pharmacies and pharmaceutical plants, hygienic regimen of their operation.	2	–	–	–
Topic 27. Hygienic estimation of location, planning, layout, sanitary and technical equipment, sanitary-hygienic and antiepidemic regimens in pharmacies.	–	4	–	–
Topic 28. Hygienic assessment of microbiologic, dust and chemical pollution of the air of pharmacies.	–	2	–	–
Topic 29. Foundations of occupational hygiene. Hygienic classification of occupations. Occupational hazards and professional diseases. Occupational hygiene at pharmaceutical plants and in pharmacies	2	–	–	–
Topic 30. Conditions and nature of labour of the personnel in pharmaceutical industry and pharmacies; prevention of occupational diseases.	–	2	–	–
Topic 31. Hygienic norms as a foundation of environment and public health protection.	–	–	2	–
Topic 32. Occupational toxicology. Hygienic estimation of hazardous chemical substances. Combined effects of xenobiotics and medicines, prognosis of their impact on human body.	–	–	4	–
Topic 33. Methods of ecologic expertise conduction at pharmaceutical plants.	–	2	–	–
Topic 34. Hygienic estimation of contemporary technological processes of synthesis of medicines, antibiotics and herbal remedies	–	–	4	–
Topic 35. Environmental pollution with medicines and its impact on public health	–	–	3	–
Total in module 2	4	10	13	–
Tonal number of hours	10	20	60	–

4. Plan of lectures

№	Topic	Number of hours
1	Hygiene as a science. Ecology as a science. Effects of environment on health. Sanitary and environmental legislation.	2
2	Hygienic importance of atmospheric air, water and soil. Sources of environmental pollution and problems of environmental protection.	2
3	Sanitary-hygienic measures during war and emergency situations of peacetime.	2
4	Hygienic requirements for pharmacies and pharmaceutical plants, hygienic regimen of their operation.	2
5	Foundations of occupational hygiene. Hygienic classification of occupations. Occupational hazards and professional diseases. Occupational hygiene at pharmaceutical plants and in pharmacies (lecture).	2
	Total	10 hours

5. Plan of practical classes

№	Topic	Number of hours
1	Methods of hygienic research. Hygienic estimation of microclimate of rooms.	2
2	Hygienic estimation of the direction and speed of air movement. Determination of natural and artificial ventilation of rooms.	2
3	Hygienic estimation of natural and artificial illumination of rooms and ultraviolet irradiation.	2
4	Hygienic requirements for drinking water and its hygienic evaluation according to the results of laboratory analysis of samples. Methods of improving the quality of drinking water.	2
5	Methods of energy expenditure and nutrients requirements calculation. Hygienic estimation of nutritional status.	2
6	Hygienic estimation of location, planning, layout, sanitary and technical equipment, sanitary-hygienic and antiepidemic regimens in pharmacies.	4
7	Hygienic assessment of microbiologic, dust and chemical pollution of the air of pharmacies.	2
8	Conditions and nature of labour of the personnel in pharmaceutical industry and pharmacies; prevention of occupational diseases.	2
9	Methods of ecologic expertise conduction at pharmaceutical plants. Final test.	2
	Total	20

6. Plan of students' self-educational work

№	Topic	Number of hours
1	Hygienic estimation of the impact of climate and weather on human health. Helio-meteorotropic reactions and diseases.	3
2	Sources and types of water supply. Infectious and non-infectious diseases transmitted through water, their prevention.	3
3	Hygienic significance of soil. Sanitary cleaning of inhabited places.	3
4	Nutrition and health. Scientific foundations of rational nutrition. Nutrition under the circumstances of unfavorable environment. Peculiarities of interaction of food substances with medicines.	2
5	Prevention of food poisonings.	3
6	Biosphere, its origin and evolution. Ecosystems: structure, classification, functioning. Socio-ecosystem structure.	2
7	Methods of environment protection from energy pollution (noise, vibration, electro-magnetic fields).	3
8	Energy and material streams in ecosystems. Bio-geochemical cycles.	3
9	Ecology and health. General regularities of human adaptation to different environmental conditions. Ecologically caused and ecologically dependent diseases.	2
10	Radiation hygiene. Hygienic problems of radiation safety of the staff working with the sources of ionizing radiation; radiation public safety.	2
11	Ecologic situation in Ukraine. Ecologic-hygienic and medical-social consequences of Chernobyl nuclear disaster.	3
12	Pesticides, agrochemicals and public bio-safety.	3
13	Biotechnology. Genetic engineering. Potential hazards of wide use of biotechnology.	3
14	Negative consequences of wide use of computers and mobile phones on the human health.	3
15	Military action as pollution factor.	3
16	Natural and anthropogenic disasters.	3
17	Hygienic foundations of the healthy lifestyle, personal hygiene. Foundations of psychohygiene. Sanitary education and hygienic education of general public.	3
18	Hygienic norms as a foundation of environment and public health protection.	2
19	Occupational toxicology. Hygienic estimation of hazardous chemical substances. Combined effects of xenobiotics and medicines, prognosis of their impact on human body.	4
20	Hygienic estimation of contemporary technologic processes of synthesis of medicines, antibiotics and herbal remedies.	4
21	Environmental pollution with medicines and its impact on public health.	3
	Total	60

10. Individual tasks are not provided.

11. Tasks for independent work: packages of test tasks, control questions, situational tasks and structured written works on the tasks of departments.

Students' independent work is assessed during the current control of the topic in the relevant lesson. Topics that are submitted only for independent work, students work in a separate notebook, performance is checked by the teacher and their enrollment is recorded in the academic journal. Enrollment criteria On a two-point scale: "credited" or "not credited"

"Credited" - the work processed by the student is presented in sufficient volume, designed in accordance with the requirements set out in the guidelines.

"Not credited" - the amount of work does not meet the requirements, the presentation of the material is inaccurate, fragmentary, there are significant errors in the answers to test tasks, incorrectly presented solutions to situational problems.

12. Teaching methods

In the educational process in teaching the discipline "Hygiene in Pharmacy and Ecology" traditional teaching methods are used: verbal, visual, practical. Methods of educational and cognitive activities: explanatory-illustrative, problem-solving, exploratory, research, methods of stimulating and motivating educational and cognitive activities, methods of control and self-control (control and correction by the teacher, self-control and self-correction, mutual control and mutual correction).

13. Methods of control

Current control is carried out at each practical lesson in accordance with the specific objectives of the lesson to determine the level of formation of a particular skill or ability, the quality of learning based on a comprehensive assessment of student activities, including control of entry level, quality of practical work, theoretical training and results final control of the level of knowledge. When controlling students' learning activities, they prefer standardized methods of control: testing, structured written work, control of practical skills in conditions close to real ones. Methods of current control and control of independent work are determined by the department and are given in the work program of the discipline. Control over the performance of independent work is carried out at the test.

The main means of mastering theoretical knowledge of hygiene in pharmacy and ecology by part-time students is independent study of program material and control work. This is done in the intersessional period in accordance with the requirements of the guidelines that students receive six months before the academic session. During the test, the part-time student answers in writing the control questions, control tests and solves situational problems. During the session period, theoretical knowledge is consolidated in lectures and practical classes and the necessary skills are developed. According to the peculiarities of teaching part-time students in the assessment of current educational activities, it is assumed to take into account the results of mandatory tests.

The final control of the discipline is carried out in the form of a test.

14. Form of final control of academic performance: credit for current performance.
The final control of the discipline is carried out in the form of a test.

15. Scheme of accrual and distribution of points received by students

Assessment is carried out in accordance with the requirements of the "Instructions for assessing the educational activities of students in the implementation of the European credit transfer system for the organization of the educational process", approved by the Ministry of Health of Ukraine on 15.04.2014.

The student's current educational activity is assessed on a four-point (traditional) scale, taking into account the assessment criteria set out in the work program.

The maximum number of points that a student can score for the current academic activity in the study of the discipline is 200 points.

The minimum number of points that a student must score for the current academic activity to enroll in the discipline is 120 points.

The calculation of the number of points is based on the current grades obtained by the student on a four-point (national) scale by calculating the arithmetic mean (SA), rounded to two decimal places. The value obtained is converted into points on a multi-point scale as follows:

$$x = \frac{CA \times 200}{5}$$

For convenience, the table of recalculation on a 200-point scale is given:

Recalculation of the average score for current activities in a multi-point scale
(final control - credit)

4-score scale	200-score scale	4-score scale	200-score scale	4-score scale	200-score scale	4-score scale	200-score scale
5	200	4,47	179	3,94	158	3,42	137
4,97	199	4,45	178	3,92	157	3,4	136
4,95	198	4,42	177	3,89	156	3,37	135
4,92	197	4,4	176	3,87	155	3,35	134
4,9	196	4,37	175	3,84	154	3,32	133
4,87	195	4,35	174	3,82	153	3,3	132
4,85	194	4,32	173	3,79	152	3,27	131
4,82	193	4,3	172	3,97	151	3,25	130
4,8	192	4,27	171	3,74	150	3,22	129
4,77	191	4,24	170	3,72	149	3,2	128
4,75	190	4,22	169	3,7	148	3,17	127
4,72	189	4,19	168	3,67	147	3,15	126

4,7	188	4,17	167	3,65	146	3,12	125
4,67	187	4,14	166	3,62	145	3,1	124
4,65	186	4,12	165	3,6	144	3,07	123
4,62	185	4,09	164	3,57	143	3,05	122
4,6	184	4,07	163	3,55	142	3,02	121
4,57	183	4,04	162	3,52	141	3	120
4,55	182	4,02	161	3,5	140	Less than 3	Not enough
4,52	181	3,99	160	3,47	139		
4,5	180	3,97	159	3,45	138		

The grade in the discipline is based on the results of current educational activities and is set on a two-point national scale: "credited" or "not credited". Points in the discipline are ranked on the ECTS scale according to the following scheme:

ECTS assessment	Statistical indicator
A	The best 10% of students
B	The next 25% are students
C	The next 30% are students
D	The next 25% are students
E	The last 10% of students

Ranking with assignments of grades "A", "B", "C", "D", "E" is conducted for students of this course who study in one specialty and have successfully completed the discipline. Students who receive grades "FX", "F" ("2") are not included in the list of students ranked.

16. Methodical support includes a synopsis or full text of lectures, plans of practical classes, independent work, methodical recommendations for teachers on each topic of practical classes, methodical recommendations for students on each topic of practical classes, containing control questions, situational tasks and tests for current control, methodical recommendations for independent work of students, containing control questions, situational tasks and tests for self-control, normative-methodical documents, demonstration materials, instructions for use of technical means of training (devices and equipment).

17. Recommended literature

Principal:

1. Hygiene and ecology : ed. by V.G. Bardov. Vinnytsa : Nova Knyga, 2018. 688 p.

Additional:

1. Мізюк М.І. Гігієна: Підручник. К. : Здоров'я, 2002. 288 с.

2. Мізюк М.І. Гігієна: Посібник для практичних занять. К. : Здоров'я, 2002. 251 с.

3. Загальна гігієна: посібник для практичних занять; за ред. І.І. Даценко. Львів: Світ, 2001. 471 с.

18. Information resources

1. Official web resources.
2. Digital textbooks and manuals.