

**THE UKRAINIAN HEALTH CARE MINISTRY
ZAPORIZHZHIA STATE MEDICAL UNIVERSITY
GENERAL HYGIENE AND ECOLOGY DEPARTMENT**



Hygiene and Ecology

**Methodical manual for teachers
on III course of medical faculty**

Module 1

Zaporozhzhia – 2015

Methodical manual for teachers on III course of medical faculty Module 1 prepared general hygiene and ecology department of Zaporozhye State Medical University, according to the working program for discipline "Hygiene and Ecology" for students of direction of prepare 1201 «Medicine», made for a specialty 7.12010001 «Curative medicine»

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The authors were guided by the modern teaching standards, verification of theoretical and practical skills due to the assessment within the credit unit system.

The case studies, tasks and tests are represented for planning practical classes on Hygiene and Ecology.

Workbook for practical classes
on Hygiene and Ecology is considered
and confirmed at the meeting of the CIC
on the hygienic disciplines of ZSMU
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**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
ЗАПОРІЗЬКИЙ ДЕРЖАВНИЙ МЕДИЧНИЙ УНІВЕРСИТЕТ
КАФЕДРА ЗАГАЛЬНОЇ ГІГІЄНИ ТА ЕКОЛОГІЇ**



Гігієна та Екологія

**Методичний посібник для викладачів
до практичних занять зі студентами
3-го курсу медичного факультету,
спеціальність «Лікувальна справа»
Модуль 1**

Запоріжжя – 2015

Методичний посібник для викладачів до практичних занять зі студентами 3-го курсу медичного факультету, спеціальність «Лікувальна справа» Модуль 1 підготовлено викладацьким складом кафедри загальної гігієни та екології ЗДМУ відповідно до Робочої програми навчальної дисципліни «Гігієна та екологія» для студентів 3-го курсу медичного факультету спеціальність «Лікувальна справа».

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Автори виходили з сучасних вимог до викладання, контролю теоретичних знань і практичних навичок, оцінювання в умовах кредитно-модульної системи.

Вирішення ситуаційних завдань та тестів передбачається планом практичних занять з навчальної дисципліни «Гігієна та екологія».

Методичний посібник для викладачів
затверджено на засіданні ЦМР
з гігієнічних дисциплін ЗДМУ
від _____ протокол № ____

**Curriculum of practical classes on Hygiene
for the 3rd year students of the medical faculty
(2014-2015)**

MODULE 1: General Hygiene

№	Topic	Hours
1.	Introduction to the course. A place and value of hygiene in the system of medical sciences and a doctor's activity. Methods of hygienic research. Organization of student's educational and research work.	2
2.	Method of determination and hygienic assessment of temperature, humidity, air movement direction, their influence on the heat exchange. Hygienic assessment of complex effects of the microclimate on the human heat exchange.	2
3.	Hygienic assessment of effulgent energy. Methods of determination of intensity and preventive dose of the ultraviolet radiation and its usage for the disease prevention and air sanitation.	2
4.	Methods of determination of CO ₂ concentration as the indicator of the anthropogenic air pollution and ventilation. Notion of an air cube, necessary and actual volume and different types of ventilation, its scientific ground.	2
5.	Basics of the preventive sanitary inspection. Method of building project examination. Methods of determination and hygienic assessment of natural lighting and artificial illumination in different premises.	2
6.	Content module # 1.	2
7.	Method of hygienic assessment of soil according to the sanitary inspection of the land parcel, results of laboratory analysis of samples and cleaning of the populated places.	2
8.	Technique of the sanitary inspection of water supply sources for bacteriological and sanitary-and-chemical analysis. Method of assessment of drinking water according to results of laboratory analysis of samples.	2
9.	Methods and facilities of cleaning, disinfection of water at the centralized and decentralizing water supply sources. Content module # 2.	2
10.	Method of calculation of human energy spending and its requirements in nutrients. Assessment of nutrition adequacy using the menu-schedule.	2
11.	Method of study and assessment of the human nutritional status and medical control of vitamin sufficiency in the organism.	2
12.	Method of expert assessment of food products and ready meals according to their laboratory analyses.	2
13.	Theoretical aspects and method of prophylaxis of alimentary diseases. Hygienic basics of dietary treatment and medical prophylactic nourishment.	2
14.	Methods of investigation of the food poisoning cases.	2
15.	Content module # 3.	2
16.	Physiology of labor. Method of hygienic and sanitary assessment of labor intensity and tension for the overwork prevention and increase of working capacity. Method of hygienic assessment of dangerous and harmful factors of the industrial environment and organism response to their impact. Sanitary legislation on labor protection.	2
17.	Method of hygienic assessment of noise and vibration.	2
18.	Method of determination of air and industrial environment chemical contaminations. Content module # 4	2
19.	Final module control: Control of practical preparation	2
20.	Final module control: Test control of theoretical preparation	2
Total:		40

**Curriculum of lectures on Hygiene
for the 3rd year students of the medical faculty
(2014-2015)**

MODULE 1: General Hygiene

№	Topic	Hours
1.	Introduction to hygiene and ecology. Basic laws of hygiene. Basics of preventive and current sanitary inspection. Principles of the hygienic norm settings. Cosmosphere, solar radiation and health. Hygienic importance of solar radiation, physical properties and chemical composition of air environment. Hygienic importance of constituents of biosphere (atmosphere, hydrosphere, lithosphere).	2
2.	Water as factor of health, its hygienic endemic and epidemiology importance. Organization of drinkable water supply. Methods of improvement of drinking water quality. Ecological problems and sanitary protection of water objects.	2
3.	Nutrition hygiene, its ecological and social problems. Hygienic assessment of food quality. Scientific basis of rational, preventive, dietary treatment. Hygienic aspects of prophylaxis of trophonosis and poisonings.	2
4.	Hygiene and physiology of labor. Classification of factors in labor process and industrial environment, tension and harmfulness. Features of hygiene of labor in separate spheres of industrial and agricultural production. Scientific organization of labor. Workplace attestation in terms of working conditions. Sanitary legislation on labor protection.	2
5.	Hygiene of children and adolescents. The law of growth and development conformities with a child organism. Hygiene of labor, physical, psycho physiological peculiarities and education of children and adolescents. Hygienic basis of preschool, school establishment planning and equipment, method of hygienic assessment.	2
Total:		10

Topic № 1

INTRODUCTORY LESSON. METHODS OF HYGIENIC RESEARCH. ORGANIZATION OF STUDENT'S EDUCATIONAL AND RESEARCH WORK (2 hours)

1. Learning objective

1.1. Master the knowledge about the hygiene as a science and the sanitation, their goals, tasks, components, significance of hygienic knowledge for doctors of different profile.

1.2. Learn the classification of hygienic methods and the facilities of the research of the environment and its influence on organism and health.

1.3. Get acquainted with the ways and methods of the public health protection, disease prevention.

1.4. Get acquainted with the procedure, topics of the students' educational, and research work, to assign the topic for each student.

2. Basics

2.1. You should know:

2.1.1. A concept of «prophylaxis» as one of basics of medicine, the hygiene and the sanitation as its components.

2.1.2. Basic concepts, methods and research facilities from physics, chemistry, biology, microbiology, physiology and other preceding courses which are used in research of environmental factors and their influence on human health.

2.1.3. Basics of the mathematical processing of medico-biological research results.

2.2. You should have the following skills:

2.2.1. The physical, chemical and bacteriological measuring of environmental objects and their influence on an organism.

2.2.2. Using the computers or calculators during the statistical processing of the results of hygienic researches.

3. Self-training questions

3.1. Prophylaxis as the main principle of public health protection. Public and individual prophylaxis; the primary, secondary and tertiary prophylaxis.

3.2. The hygiene as a scientific discipline, its purpose, tasks, essence.

3.3. Methods of hygienic research, their classification, description.

3.4. Methods of the environment inspection (sanitary inspection and description; organoleptic, physical, chemical, bacteriological methods, their essence and usage in hygiene study).

3.5. Methods of research of the environmental influence on the human health (experimental physiological, biochemical, histological, histochemical, haematological, toxicological, natural experiment methods, clinical).

3.6. Setting of hygienic norms and regulations as a basis of environment and public health protection, its objects and types.

3.7. Distinctive features of setting of norms and regulations for natural environmental factors, and anthropogenic factors.

3.8. Principles of the hygienic norm and regulation setting, organizations, responsible for that. Sanitary and legal legislation on the environment and public health protection.

3.9. Sanitation as a practical application of hygienic regulations and sanitary norms and rules, its use in work of health-officers and doctors of other specialties.

4. Structure of the lesson

This is the seminar. At the beginning of the lesson a written (or a computer-based) test is performed to control the initial level of students' knowledge.

The definitions of hygiene, sanitation", their objectives, tasks, classification of methods, ways of reaching the objectives and fulfilling tasks are considered in details in the main part of the lesson. The students are acquainted with devices and equipment required for the hygienic research, forms of sanitary inspection – preventive and regular.

During the break, the tutor presents to students the Chair, its history, directions to scientific research.

After that, the tutor informs the students about the order of the protocol registration and the order for working off the missed lessons.

At this lesson, the students receive the topic for their educational and research work (may be either a report or an experimental research).

5. Literature

5.1. Principal:

5.1.1. Hygiene and human ecology. Manual for the students of higher medical institutions/ under the general editorship of V.G. Bardov. – Kiev, 2008. – 720 p.

5.1.2. General hygiene and environmental health. Manual for the students of high medical schools/ under the general editorship of M.M. Nadvorny – Odessa, 2005. – 242 p.

5.2. Additional:

5.2.1. General hygiene and medical ecology. Textbook for student's medical faculty/ under the general editorship of S. Shibanov. – Simferopol, 2004. – 540 p.

6. Equipment required for the lesson

1. Devices for physical factors measuring (thermometers, psychrometers, anemometers, luxmeters, noise dosimeters, dosimeters, radiometers).

2. Devices and equipment for chemical research methods (photoelectrocolorimeter, reagent samples, chemical dishes etc.).

3. Devices for bacteriological analysis (Krotov's device, microscopes etc.).

4. Devices for physiological-hygienic research.

ORDER OF THE LESSON PROTOCOL REGISTRATION

1. While preparing for the lesson the students write down the following information from the "Practical lesson textbook":

date _____

Protocol # _____

Topic of the lesson:

Objective of the lesson:

Basic knowledge and skills (to know _____, to have skill _____)

Solution of the self-training assignments.

2. *At a practical lesson*

The student writes the answers to the theoretic questions considered during the lesson down in the protocol.

Furthermore, the student must write down the following information in the laboratory lesson:

- methods of the laboratory research;
- the results of the studies;
- necessary calculations;
- conclusions and recommendations.

3. The student draws instruments, nomograms, diagrams (or copies them and sticks into the protocol with the glue) used in the lesson.

THE FOLLOWING DOCUMENTS MUST BE PRESENTED AT THE FINAL COURSE EXAMINATION

1. The protocol copy-book;
2. Lecture materials;
3. The abstract or the scientific report on SERW;
4. The report of the object inspection (a residential house, a hospice etc.);
5. The report on missed lectures (or the document confirming the illness, donorship etc.).

SERW PROCEDURE ALGORITHM

1. Define the topic and type of work (abstract, participation in experimental research, illustration etc.).

2. Get the notebook and write all your notes down into it.

3. Carry out the primary bibliographic information search, write out the data about 15-20 sources, read 3-5 of them, including generalized (in manuals, encyclopaedias, textbooks, crucial monographies).

4. Make the project of the work plan; define the questions, necessary for the topic disclosure.

5. Coordinate the plan of work, order and its performance terms with the teacher.

6. Study the literature on the topic, which was selected during the primary bibliographic information search and during the further work. Write down the crucial information including illustrations and tables in your notebook. Continue the information search according to the topic.

The students, that chose the experimental research, illustrating work, or the mastering of the new methods, start the work on their topics at this point.

7. Generalize materials; make the tables, original diagrams, figures.
8. Make the initial variant of the abstract, consult your teacher about necessary corrections and additions.
9. Make the final version of the abstract.
10. Hand the finished abstract to the teacher in time, but not later than 3 weeks before the semester end.
11. Under the teacher's guidance, prepare a short (10-12 minutes) report on your work for further representation at a final student's conference (group, chair, faculty, university, intercollegiate, international etc.).

STUDENTS EDUCATIONAL RESEARCH WORK PROCEDURE

Abstract or report on ERW should include the following:

- 1) The title page with the following data at the top:
 - name of university;
 - name of department;
 - the academic status, surname, initials of the Head of Department (to the right).

In the middle of the page (in capital letters) – the topic of the abstract or scientific report.

Lower, on the right - your surname, initials and your supervisor's academic status, surname, initials.

At the bottom of the page the city of the institution location, and the year of the work are placed.

- 2) The abstract or scientific research report plan.

- 3) The abstract or scientific research text (15-20 pages of the handwritten text on the standard A-4 paper sheets).

The text should be divided into the paragraphs (sections) according to the plan or contents.

The names of the authors and edition years of the materials, mentioned in the report should be specified in the report.

It is recommended to enrich the text with demonstrational materials (tables, diagrams, and figures) in particular this concerns the scientific research reports.

- 4) The conclusions with the comparative assessment of materials, considered in the abstract, or SERW results.

- 5) The list of the used literature, arranged according to the bibliography requirements (in the original languages of the books):

- for textbooks, monographies, theses abstracts: the authors (surname, initials), title, - place of publication; the publisher name, publication year –number of pages;

- for magazines, collected scientific research: the authors surnames, the initials (three surnames "and other" format is used), title. / Name of the collection. - city, edition year. - pages (from - to).

The supervisor (teacher of group) checks the abstract or report, indicates the mark, defects, notes/remarks on title page.



Topic № 2

METHOD OF DETERMINATION AND HYGIENIC ASSESSMENT OF TEMPERATURE, HUMIDITY, AIR MOVEMENT DIRECTION, THEIR INFLUENCE ON THE HEAT EXCHANGE. HYGIENIC ASSESSMENT OF COMPLEX EFFECTS OF THE MICROCLIMATE ON THE HUMAN HEAT EXCHANGE (2 hours)

1. Learning objective

1.1. Substantiate the hygienic significance of microclimate for different premises (residential, public/social, industrial) and master the measurement and hygienic assessment of its following parameters: air temperature, radiant temperature, relative humidity.

1.2. Master the methods of determination and hygienic assessment of the air movement direction and speed.

2. Basics

2.1. You should know:

2.1.1. Definition of «microclimate» and factors, which influence its formation.

2.1.2. Physiological basics of human heat exchange and thermoregulation, their dependence on the microclimate: physiological reactions in the comfortable or uncomfortable (hot or cold) microclimate.

2.1.3. Hygienic significance of the atmospheric and indoor air, its role in the microclimate formation and mechanisms of the organism heat exchange.

2.1.4. Methods and devices for determination of the air movement direction and speed outdoors and indoors.

2.2. You should have the following skills:

2.2.1. To measure the indoor air temperature, radiant temperature, air humidity and to assess the temperature and humidity conditions of different premises (residential, public/social, industrial).

2.2.2. To determine the air movement direction and speed, wind strength.

2.2.3. To draw the hygienic conclusions and assess the results of the outdoor and indoor air movement direction and speed measurement.

3. Self-training questions

3.1. Definition of “microclimate” and factors that influence its formation.

3.2. Physiological mechanisms of heat exchange and thermoregulation as factors in the warm-blooded organism thermal status: heat production and loss. The heat loss ways: through respiration and skin, with discharges.

3.3. Physiological changes in thermoregulation mechanisms in hot and cold microclimate.

3.4. The air humidity indices: absolute, maximum and relative humidity, physiological humidity, humidity deficit, physiological humidity deficit, dew point and their hygienic significance.

3.5. Devices for measuring the air temperature, radiant temperature, air humidity indices and their operation.

3.6. Hygienic significance of the atmospheric air movement, its influence on the purity of atmosphere, formation of the climate and the weather. The influence of strong winds on the environment, physiological state of organism, its psycho-emotional activity.

3.7. Usage of the dominant wind direction for the preventive sanitary inspection during the projection of the residential settlements, industrial premises, recreation areas. "Wind rose".

3.8. Significance of the air movement for microclimate formation, its influence on the organism heat exchange, convective and evaporative heat loss.

3.9. Systems for the indoor air movement improvement. The natural and artificial ventilation.

3.10. Classification and properties of devices for the air movement direction and speed determination.

4. Self-training assignments

4.1. The average air temperature in the hospital ward is 18.5°C , at 1.5 meter height - 22°C and at 0.2 meter height - 16°C , near the inner wall its 21°C , near the outer wall - 15°C . Daily temperature variation according to the thermograph is from 23°C to 18°C . Assess the thermal conditions in this ward hygienically.

4.2. What is the normal range of the air relative humidity for residential premises? Choose the correct answer:

1. 20-40%;
2. 20-50%;
3. 30-60%;
4. 35-70%;
5. 40-80%;

4.3. The Assmann psychrometer's dry thermometer shows 22°C , wet thermometer - 14°C . The atmospheric pressure is 745 Hg mm. Calculate the absolute, maximum and relative air humidity, humidity deficit, physiological humidity deficit, find the dew point.

4.4. The new hospital is projected in the settlement. The "wind rose" has the following data: North - 8 %, North-East - 7 %, East - 6 %, South-East - 4 %, South - 8 %, South-West - 11%, West - 22%, North-West - 27%, calm - 7%. There is the thermoelectric power station in the area. Determine, in which direction towards the power plant it is better to place the hospital.

4.5. The ball catathermometer factor (F) is 620, time while the spirit column drops from 38 to 35°C in 100 seconds and the air temperature is 26°C . Determine the air movement speed for the industrial section with these parameters.

5. Structure and content of the lesson

This is a laboratory lesson. The theoretical questions of this topic are learned by students' questioning and teacher's explanations.

After that, the students receive the individual tasks for the preventive sanitary inspection (according to the wind rose determination and assessment) of different construction sites, determine the air temperature in different points of the class-room and the air humidity and the air movement speed using revolving-vane or revolving-cup (wheel-type) anemometers in the ventilation opening and the indoor air movement speed using ball catathermometer.

The results of measurement are written down into the protocol, the students compare these results with hygienic regulations presented in the appendices, draw a conclusion about the microclimate of the premise and give recommendations about the optimization of those conditions.

6. Equipment required for the lesson

1. Thermometers (alcohol, mercurial, maximum, minimum, wall).
2. Psychrometers (August stationary, Assmann aspiration).
3. Hygrometers (hair, membrane/diaphragm).
4. Barometer - aneroid.
5. Self-recording devices (barograph, thermograph, hygrograph).
6. The table of saturated water vapours.
8. Anemometers (revolving-cup, dynamic).
9. Static revolving-vane anemometer and ball catathermometer.
10. Table for the air movement speed determination using catathermometer.
11. Table for the wind strength assessment (Richter scale).
12. The students' task for the assessment of the temperature and humidity conditions of premises and to determine and assess the preferred winds and indoor air movement speed.



Topic № 3

METHODS OF DETERMINATION OF INTENSITY AND PREVENTIVE DOSE OF THE ULTRAVIOLET RADIATION. USAGE OF THE ULTRAVIOLET RADIATION FOR THE DISEASE PREVENTION AND AIR SANATION (2 hours)

1. Learning objective

1.1. Become familiar with physical and biological characteristics of ultraviolet radiation (UVR).

1.2. Master the methods of measuring the ultraviolet radiation intensity and the methods of organization of the UV irradiation (UVI) for the purpose of the UV deficiency prevention and the control of it.

1.3. Master the methods of air sanitation by the UVR and its efficiency assessment.

2. Basics

2.1. You should know:

2.1.1. Nature, physical characteristics and spectral distribution of the solar radiation.

2.1.2. Main biological effects of the UVR.

2.1.3. Deficiency and excess of the UVR and its effect on health.

2.1.4. Types of the artificial UVR sources. Photaria.

2.1.5. Methods of measuring and estimation of the UVR intensity.

2.2. You should have the following skills:

2.2.1. Working with Gorbachov's biodosimeter according to its instruction.

2.2.2. Usage of the UVR for disease prevention and air sanitation at the patients' care institutions, child institutions and workplaces.

2.2.3. Calculation of the preventive dose and selection of the UV irradiation procedure.

2.2.4. Planting the microorganisms into the air samples using the Krotov's device. Calculation of the number of colonies on beef-extract agar (BEA) in Petri dish before and after the air UV irradiation for the determination of the microbial air pollution and air sanitation efficiency.

3. Self-training questions

3.1. The nature of the solar radiation, basic constituent elements.

3.2. Spectral distribution of the ultraviolet diapason of the solar radiation at the edge of the atmosphere and earth surface (regions A, B, C). The ozone layer and its hygienic significance.

3.3 Artificial ultraviolet radiation sources, their physical and hygienic characteristics.

3.4. Measuring methods of the UVR intensity – physical, photochemical, biological, mathematical (calculation).

3.5. Types and mechanisms of the UVR effects: biogenic – general-stimulatory, vitamin D forming, chromogenic and non-biogenic – bactericidal, virulicidal, cancerogenic etc.

3.6. Erythemat, physiological, preventive doses of the UV radiation. Quantitative determination of the UVR intensity using different measuring methods.

3.7. The UVR disadvantage and its effect on health. Main symptoms of “solar insufficiency” and cases requiring the preventive UV irradiation.

3.8. Artificial UVR sources, principles of their functioning, main technical characteristics. Photaria.

3.9. Excessive exposure to natural and artificial UVR sources. “Ozone holes” as a hygienic problem. UVR as an occupational hazard. Methods and means of protection.

4. Self-training assignments

4.1. Forearm skin was locally exposed to the LE-30 lamp during 5 (five) minutes. Barely perceptible reddening (erythema) appeared under the second window of Gorbachov’s biodosimeter after 20 hours. Calculate the UVR intensity in biological, photochemical, physical measures. What are physiological and preventive doses in these measures?

4.2. Erythemat ultraviolet dose is reached by the exposure to the LE-30 lamp during 4 minutes at a distance of 2 m from the source. Calculate the exposure time required to receive the preventive dose at a distance of 4 meters from the source?

4.3. Determine the physiological and preventive dose of the UV irradiation for yourselves in accordance to the erythemat dose indicated by Gorbachov’s biodosimeter. (From the previous lesson).

4.4. The preventive UVR dose is reached by the exposure to the beacon irradiator with 10 LE-30 lamps (capacity of 30 Wt) at the distance of 0.5 m during 2 minutes. What is a distance (using the same source) for a group of the children of kindergarten age to receive a preventive dose during 5 minutes of exposure?

4.5. An irradiator with BYB-30 (BUV-30) lamps was used for the air sanitation in the school class rooms (area was 50 m², height was 3.5 m) during 1 hour during the influenza epidemic. Planting of the air was done on BEA in Petri dishes in Krotov’s device before and after the UVR irradiation, (planting speed was 20 l/min during 10 minutes). 65 colonies were grown before the sanitation, 12 – after the sanitation in Petri dishes on BEA. State a hygienic value of the air sanitation efficiency.

5. Structure of the lesson

This is a laboratory lesson. At the beginning of the lesson the students will have knowledge of basics checked and theoretical questions examined. After that the students perform the following exercises by themselves:

5.1. Determination of the erythemat dose and calculation of the preventive dose of the UVR: according to the instruction manuals (see appendix), students will perform the measuring of the UVR intensity at the indicated distance from the LE-30 lamp or the direct MQL (mercury-quartz lamp) using three methods – physical, photochemical, biological.

Students will only perform the first phase of the biological method measuring during this lesson. They will irradiate the forearm skin of each other using the Gorbachov's biosimulator and indicate numbers of windows or the exposure time on the skin. Students will be able to determine the erythemal dose after 18-20 hours. Then they should write it down in the protocol, and prepare the calculations of the physiological and preventive doses for themselves for the next lesson.

5.2. Estimation of the air sanitation efficiency after the use of bactericidal lamps: the room is irradiated by the bactericidal lamps. Microbial planting from air samples was done on BEA in Petri dishes in Krotov's device before and after irradiation for the UV bactericidal effect determination. Dishes are located in thermostat during 24 hours (the temperature is 37⁰C). The students calculate colonies number in the lesson and estimate the results in accordance to the table.

5.3. Solution of the situational tasks dealing with the preventive dose of the UV irradiation for different people groups (pre-school and school age children, people suffering from the UVR deficiency or absence, patients suffering from chronic cardiovascular diseases and the air sanitation efficiency of different premises.

6. Equipment required for the lesson

1. The ultravioletmeter (uvmeter) DAU-81 or another type.
2. Gorbachov's biosimulator.
3. Tape-line or tape measure.
4. Artificial UVR sources: direct mercury-quartz lamp (MQL), mercury-arc lamp (MAL), erythemal lamp (LE-30), bactericidal lamp (LB-30).
5. Reagents.
6. Krotov's device.
7. Petri dishes with beef-extract agar planted with indoor air before and after the sanitation performed with LB-30.



Topic № 4

METHODS OF DETERMINATION OF CO₂ CONCENTRATION AS THE INDICATOR OF THE ANTHROPOGENIC AIR POLLUTION AND VENTILATION. NOTION OF AN AIR CUBE, NECESSARY AND ACTUAL VOLUME AND DIFFERENT TYPES OF VENTILATION, ITS SCIENTIFIC GROUND (2 hours)

1. Learning objective

- 1.1. Strengthen the student's knowledge about chemical composition of the air, the atmospheric and the indoor air pollution sources.
- 1.2. Master the main methods of sanitary and chemical analysis of the air samples.
- 1.3. Master the methods of the air express analysis using the gas-analyzer UG-2.
- 1.4. Master the methods of the hygienic assessment of the indoor air purity.
- 1.5. Get familiar with the factors and indicators of the air pollution for indoor residence and manufacture areas.
- 1.6. Master the methods of hygienic assessment of the air purity and efficiency of the indoor ventilation.

2. Basics

- 2.1. You should know:
 - 2.1.1. Physiological and hygienic significance of the air components and their influence on the human health and sanitary conditions.
 - 2.1.2. Atmospheric, indoor and working chemical air pollution factors and indices and their hygienic regulation.
 - 2.1.3. Classification of the air sampling methods.
 - 2.1.4. Principal scheme of the aspiration method of the air sampling for chemical analyses, devices and measures used for this procedure.
 - 2.1.5. Indoor air circulation. Types and classification of the indoor ventilation, main parameters of the ventilation efficiency.
- 2.2. You should have the following skills:
 - 2.2.1. To justify the choice of the air sampling method for sanitary and chemical research.
 - 2.2.2. To determine of the carbon dioxide concentration in the air and assessment of the indoor air purity.
 - 2.2.3. To calculate of the required and actual volume and rate of the indoor ventilation.

3. Self-training questions

- 3.1. Chemical composition of the atmospheric and expired air.
- 3.2. Main communal, domestic, public and industrial air pollution sources. Criteria and indicators of the air pollution (physical, chemical, bacteriological).

3.3. The residential indoor air pollution sources. The air oxidability and carbon dioxide as sensitive indirect characteristics of the air pollution by people.

3.4. Indices and requirements to the air sampling for sanitary and chemical research purposes.

3.5. Aspiration methods of the air sampling, the air aspiration devices.

3.6. Absorbing devices and the absorbing mass, their characteristics, types and purposes.

3.7. Express-analyses (colorimetric, linear-colorimetric), determination of the chemical contaminants in the air. The universal gas-analyzer UG-2 (УГ-2), its construction and principle of functioning.

3.8. Influence of the various carbon dioxide doses on the organism.

3.9. Express methods of the carbon dioxide concentration determination in the air (method by Prokhorov).

3.10. Indoor ventilation and its hygienic significance. Types and classification of the ventilation of the communal, domestic and industrial premises.

3.11. Indicators of the ventilation efficiency. The required and actual volume and ventilation rate, methods of their determination.

4. Self-training assignments

4.1. The air sampling was performed in a workshop with the thermoplastic automates for determination of the epychlorhydrine presence in the working air. The air in volume of 50 liters under temperature $+16^{\circ}\text{C}$ and barometric pressure 755 Hg mm was passed through the absorbing device with absorbing mass in it. Convert the selected air volume to its value in the standard conditions.

4.2. Calculate the carbon dioxide volume expired during one hour by person performing the physical activity under calm conditions.

4.3. Calculate the required ventilation volume for a patient in the ward and for a surgeon on the day of the operation. (see appendices).

4.4. Calculate the required ventilation rate of the 4-bed ward with the 30 m^2 area and 3.2 m ceiling height.

5. Structure and content of the lesson

This is a laboratory lesson. At the beginning of the lesson, students will have their knowledge of basics checked. After that, students receive individual tasks and, using the appendices and recommended literature, get acquainted with air sampling devices for chemical research, calculate the required air volume for particular chemical analyses and perform the proper air sampling. The one air chemical pollutant concentration is prepared by the laboratory using the universal gas-analyzer (UG-2).

Students determine the concentration of this air chemical pollutant in practice; determine the concentration of carbon dioxide in the air of the laboratory and outside (atmospheric air), perform the required calculations and draw a conclusion based on the results; calculate the required volume and rate of the laboratory ventilation in accordance to the number of people present, and heaviness of their physical activity; measure the air volume, coming into or being drawn out of the indoor, calculate the

actual volume and rate of the ventilation, draw the grounded conclusions and give recommendations. The practical part is to be written down in the protocol.

6. Equipment required for the lesson

1. Janet's syringe (50-100 ml).
2. Solution of dehydrated soda NaCO_3 (5.3 g in 100 ml of distilled water) with 0.1% phenol-phthalein solution.
3. 10 ml pipette.
4. Freshly boiled and cooled distilled water in the bottle.
5. Formula for calculation of the required volume and rate of the indoor ventilation.
6. Measuring tape.
7. Student's exercises for determination of the CO_2 concentration in the air and indoor ventilation indicators.



Topic № 5

BASICS OF THE PREVENTIVE SANITARY INSPECTION. METHOD OF BUILDING PROJECT EXAMINATION. METHODS OF DETERMINATION AND HYGIENIC ASSESSMENT OF NATURAL LIGHTING AND ARTIFICIAL ILLUMINATION IN DIFFERENT PREMISES (2 hours)

1. Learning objective

1.1 Learn the hygienic requirements for natural and artificial lighting in different premises.

1.2 Master the geometrical, lighting engineering methods of natural lighting indices determination, to learn how to assess the results of instrumental measuring, and to draw a hygienic conclusion about natural lighting in differing premises.

1.3 Master the methods of the measurement and hygienic assessment of artificial illumination in different premises with the help of a luxmeter and calculation methods. Determination of the surface brightness.

2. Basics

2.1. You should know:

2.1.1. Physical characteristics and hygienic significance of natural lighting, tasks and criteria of its assessment considering the type of visual works and functions of the premises.

2.1.2. Physiological functions of the visual analyzer, their dependence on illuminance.

2.1.3. Main harmful effects of insufficient and excessive lighting on human health and work capacity. The influence of lighting on shortsightedness development.

2.1.4. Measuring methods and indices of the natural lighting.

2.1.5. Types of artificial illumination and their comparison (advantages and disadvantages).

2.1.6. Methods of artificial illumination assessment and the principles of its hygienic regulation.

2.2. You should have the following skills:

2.2.1. To determine and assess the geometrical indices of natural lighting in different premises.

2.2.2. To measure and assess the lighting using a luxmeter, the daylight factor (DF) determination and their hygienic assessment.

2.2.3. To give a comprehensive hygienic assessment of the artificial illumination of the premises and workplaces, considering the type of visual work and premises' function.

2.2.4. To draw the motivated conclusions and make recommendations concerning the optimization of the artificial illumination.

3. Self- training questions

3.1. Physical nature and the hygienic significance of lighting in different premises (residential, classrooms, workshops, medical and other).

3.3. Internal and external factors that influence the level of natural lighting in different premises. Hygienic requirements for the natural lighting in different premises.

3.4. Geometrical methods of assessment of lighting in premises during preventive and regular sanitary control (lighting coefficient, angle of incidence, angle of aperture, depth, and premises depth coefficient determination).

3.5. Lighting engineering methods of lighting assessment in different premises. Lighting measurement by luxmeter. Determination of the daylight factor factual value during the regular sanitary control.

3.6. Hygienic significance of artificial illumination as an environmental factor in the modern world.

3.7. Influence of artificial illumination on the functional state of the central nervous system and on the work capacity.

3.8. Comparative hygienic assessment of different sources of artificial illumination (the advantages and disadvantages of incandescent and luminescent lamps).

3.9. Illuminance determination using the “Watt” calculation method, its essence and main calculation stages.

3.10. Legislative documents that regulate natural and artificial illumination in different premises and other objects of different purpose.

4. Self-training assignments

4.1. Determine the lighting coefficient and perform the hygienic assessment of the living room, which is 3.5×5 m, has 1 right-angled window (2.5×1.8 m) with double wooden window frames. What additional factors can influence the premises' lighting conditions?

4.2. What is the classroom DF if the lighting equals 200 lux near its internal wall and 20 000 lux near external? Does the result correspond to norms?

4.3. Using the “Watt” method, calculate and assess the illumination in a 40m^2 classroom, illuminated by 6 incandescent lamps (each lamp is 200 Wt).

4.4. Calculate the brightness of an operative field if the illumination is 4 000 luxes. The reflection coefficient of the wound is 0.35. Will such brightness cause a visual discomfort?

4.5. An incandescent lamp 1.5 m away produces the illumination of 150 luxes on the workplace. How will the illumination level change if the lamp is moved to 3 m away?

4.6. The 20m^2 manipulation room is illuminated by 6 direct lamps, 40 Wt each. Calculate the approximate illumination using the “Watt” method. Tell, if that is enough.

5. Structure and content of the lesson

It is a practical lesson, held in the laboratories. After the knowledge examination, each student is given his individual task, necessary devices, do the necessary measurements and calculations, make the grounded decisions and recommendations.

Students report the main results of their work during the final stage of the lesson. The final level of students' knowledge is checked by questioning about the research results and checking of the protocols.

6. Equipment required for the lesson

1. Luximeter.
2. Measuring tape.
3. Trigonometric table.
4. Examples of artificial illumination sources: incandescent lamps, gas and luminescent lamps etc.
5. Samples of the illumination fixture (5 types, for different light directions).
6. Curtains for the window blackout.
7. Tables:
 - Standards for the artificial illumination of the classrooms;
 - Standards for the artificial illumination of industrial areas;
 - The maximum horizontal illuminance with 10 Wt/m² lamp specific capacity.
8. Student's task on indices determination and lighting assessment.



CONCLUDING LESSON ON SECTION «GENERAL QUESTIONS OF HYGIENE»

1. Learning objective

Assess the students' theoretical knowledge and practical skills, acquitted during the "General questions of hygiene" section of the course.

2. Basics

2.1. You should know:

2.1.1. Theoretical basics of the hygiene as a branch of medical science and medical practice according to the corresponding sections of recommended literature, materials of the lectures and practical lessons, self-training questions list.

2.2. You should have the following skills:

2.2.1. Determine and assess:

- the UVR intensity, preventive dose and bactericidal effectiveness; indices of microclimate, and their influence on the human organism and public health;
- indices of natural and artificial lighting and its influence on the visual analyzer functions;
- determine the indoor air CO₂ concentration and calculate necessary and actual ventilation volume and rate.

2.2.2. The air sampling for dust content, chemical and bacteriological pollutions analysis and further assessment of their results.

2.2.3. Determination of the oriented safe influence levels (OSIL) of the chemical air pollutants, based on their physical and chemical characteristics.

2.2.4. Master the basics of preventive and regular sanitary inspection;

- architectural and building drawings reading and assessment;
- usage of the legislative and normative documents of sanitary legislation.

3. Self-training questions

3.1. Hygiene as a medical science, its objectives, tasks, contents, the profile hygienic disciplines. Sanitation. Environment and external environment.

3.2. Methods of hygienic research and their classification. Specific methods of hygiene.

3.3. Methods of studying of the environmental factors.

3.4. Methods of studying of the environmental effect on human body and health.

3.5. Basics of sanitary legislation, its types and significance for preventive and regular inspection. Principles and forms of hygienic regulation.

3.6. Particularities of the hygienic regulation of the natural, anthropogenic and man-caused factors.

3.7. Solar radiation, its basic constituent elements and their characteristics.

3.8. Spectral distribution of the ultraviolet diapason of the solar radiation at the edge of the atmosphere and earth surface (regions A, B, C). The ozone layer and its hygienic significance.

3.9. Factors from which the UVR intensity in the area or premises depends on.

3.10. Types and mechanisms of the UVR biogenic effect – general-stimulatory, chromogenic, vitamin D forming, bactericidal. Distinctive features of the biogenic effect for each region of the UVR spectral distribution.

3.11. Methods and devices for the measurement of the UVR intensity – physical, photochemical, biological, mathematical (calculation). Ultraviolet intensity measurement units, used with these methods and their interrelation.

3.12. Definition of physiologic and preventive ultraviolet radiation doses. Their quantification using the different methods of the intensity determination, microer, microbact.

3.13. Health disturbances and diseases caused by the UVR insufficiency. Main symptoms of the “solar insufficiency” and indications for the UVR preventive radiation.

3.14. Application of the natural and artificial UVR sources for the different diseases primary and secondary prevention and treatment.

3.15. Types of the artificial UVR sources, their principles of operation, basic technical properties, usage for prevention and treatment.

3.16. Excess exposure of a human to the solar and artificial radiation. “Ozone holes” as the hygienic problem. The UVR as an occupational hazard. Methods and devices for measuring the excess UV irradiation in the industry, in medicine.

3.17. Physical nature and hygienic significance of natural lighting. Main light engineering values (light intensity, luminous/light flux, spectrum, lighting, brightness), their measurement units.

3.18. Hygienic requirements for the indoor natural lighting. External and internal factors, that influence the indoor natural lighting level. Indices and standards of natural lighting for different premises.

3.19. Assessment of the indoor natural lighting using geometric methods during preventive and regular sanitary inspection (lighting coefficient, angle of incidence and aperture, premises depth coefficient determination).

3.20. Assessment of the lighting in premises using light engineering methods. Measuring of the illuminance with the luxmeter.

3.21. Hygienic significance of artificial lighting for people’s life, rest, productive activity.

3.22. Comparative hygienic characteristic of the different artificial lighting sources (advantages and disadvantages of incandescent and luminescent lamps).

3.23. Main lighting indices and factors, which influence the lighting level. Types of lighting fittings.

3.24. The artificial lighting calculation for premises using “Watt” method, its main stages.

3.25. Main documents and standards regulating the artificial lighting for premises and other objects.

3.26. Definition of “microclimate” and its forming factors.

3.27. The air and radiant temperature, their hygienic significance, methods and devices for measuring (thermometers, thermographs).

3.28. The air humidity and its indices: absolute, maximum, relative, physiological relative humidity, humidity deficit, physiological humidity deficit, dew point and their hygienic significance.

3.29. Devices for the air humidity determination (static August psychrometer, aspiration Assmann psychrometer, hygrometer, hygrograph, principles of their operation).

3.30. Physical basics of air movement. Hygienic significance of the atmospheric air movement for the climate and weather formation and purity of atmosphere.

3.31. Usage of dominant wind directions in the preventive sanitary inspection during the construction of the settlements, industrial enterprises and recreation zones. "Wind rose".

3.32. Significance of indoor air movement for microclimate formation. The air movement measurement methods and devices.

3.33. Thermal equilibrium and organism heat exchange with environment. Factors forming heat production and loss. The human heat state subjective and objective indices in different microclimate.

3.34. Methods for studying of the influence of certain microclimate factors on the human organism.

3.35. Cold microclimate and its influence on human organism. Physiological reactions and diseases caused by cold microclimate.

3.36. Hot microclimate and its influence on human organism. Conditions caused the overheating. Physiological and pathological symptoms of acute and chronic overheating. Solar and heat strokes. Overheating prevention.

3.37. Hygienic standards of microclimate parameters for different premises, their scientific substantiation.

3.38. Chemical composition of atmospheric air and its influence on human body. Hygienic significance of nitrogen, oxygen, carbon dioxide, air humidity.

3.39. Sources of the atmospheric air pollution with chemical substances (natural, transport, industrial) and their hygienic significance. Smog.

3.40. Methods and means for the atmospheric air protection from man-caused pollutions.

3.41. Sources of the air pollution in residential, public, industrial premises and their hygienic characteristics.

3.42. The microbiological indoor air pollution (bacteria, viruses, fungi) and its part in transmission of respiratory infections and allergies.

3.43. Sanitary inspection of the indoor air purity in populated premises: determination of the air oxidation and CO₂ concentration as sanitary indices of the air pollution with products of human vital activity (sweat, sebaceous humour, necrotic epidermis, dust, microorganisms).

3.44. Carbon dioxide as the man-caused air pollutant in industrial premises where processes of combustion, fermentation and putrefaction are occurring (hot sections, vegetable stores, inspection chambers of sewerages, communications).

3.45. Maximum allowable concentrations of CO₂ in premises as a sanitary index of the air pollution with the products of human vital activity and as a pollutant in industrial premises.

3.46. The indoor CO₂ concentration determination using the method in Prokhorov's.

3.47. Express methods of the air chemical pollutants determination in industrial premises using universal gas analyzer UG-2. Construction and principle of operation of the device.

3.48. Aspiration methods of the air sampling for the air chemical pollutants concentration determination, devices used for aspiration and determination of aspiration rate (rheometers, ratemeters) or passed air volume (gas meters).

3.49. Natural indoor ventilation, its hygienic significance and means for improvement.

3.50. Artificial indoor (enforced) ventilation (inflow, outflow, inflow-outflow), its technical hardware. The air conditioning, principles of air-conditioner operation.

3.51. Necessary and virtual volumes and multiplicity of ventilation, their hygienic substantiation, principle of calculation using anthracometric (by MAC of CO₂ for residential premises) and MAC of corresponding pollutants (for industrial premises) methods.

4. Self-training assignment

4.1. Study and repeat the recommended literature, lecture materials.

4.2. Repeat the methods of measurement, practical skills listed in 2.2, and in instructions for the corresponding practical lessons.

4.3. Repeat the solutions of self-training assignments and tasks solved at practical lessons during the study of the physical and chemical factors of environment.

5. Structure and content of the lesson

The concluding lesson (2 academic hours) is conducted in the Chair's laboratories equipped with devices from all areas, covered by practical lessons of the "General questions of the hygiene" section.

Each student receives the individual control assignment containing 3-4 theoretical questions, situation tasks and practical work for measurement of one of environmental factors, using available devices.

The students answer the theoretical questions and solve situation tasks in written form, or in form of a computer-controlled test prepared by the department/chair. All this activity is done during the first half of lesson (45 min.).

The second part of the lesson (45 min.) is conducted verbally by students' cross-questioning, discussion and correction of the wrong answers, task solution and practical measurement skills using the available devices.

The mark is put down into the academic register based on the concluding lesson results. In case of the unsatisfactory mark, the student has to re-sit the concluding lesson off-hour*.

6. Literature

6.1. Principal:

6.1.1. Hygiene and human ecology. Manual for the students of higher medical institutions/ Editor prof. V.Bardov. – Kiev, 2008. – 720 p.

6.1.2. General hygiene and environmental health. Manual for the students of high medical schools/ Editor prof. M. Nadvorny – Odessa, 2005. – 242 p.

6.2. Additional:

6.2.1. General hygiene and medical ecology. Textbook for student's medical faculty/ Editor prof. S.Shibanov. – Simferopol, 2004. – 540 p.

7. Equipment required for the lesson

1. Devices for determination of microclimate parameters, UV radiation, air pollution with dust, chemical substances, CO₂.
2. Legislative documents (BNandR, SanRansS, SS of Ukraine, instructions).
3. Learning albums with projects.
4. Situation tasks for skill checking.

Examples of control assignments

Variant 1

- 1.1. Hygiene as a branch of the theoretical and practical prevention and treatment medicine. Methods of hygiene, their classification and characteristics.
- 1.2. The microclimate parameters hygienic significance, physical characteristics, measurement units and principles of regulation.
- 1.3. Carbon dioxide concentration as an index of indoor air pollution in residential premises, its hygienic significance.
- 1.4. Erythemal UVR dose measured with Gorbachov's biodosimeter at the standard distance of 0.5 m is 3 min. Calculate the preventive dose at the 3 meter distance.
- 1.5. Determine and assess the illuminance of the workplace in the most distant point from the windows using luxmeter.

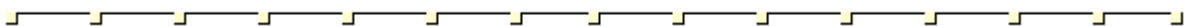
Variant 2

- 2.1. Methods of studying of the environmental factors. Basics of sanitary legislation, its types and significance for preventive and regular inspection.
 - 2.2. Spectral distribution and hygienic characteristics of solar radiation.
 - 2.3. Hygienic significance and classification of the dust, methods of determination and hygienic regulation of the dust content in the air.
-

- 2.4. Determine six indices of the air humidity if the values of dry-bulb and wet-bulb Assmann psychrometer are 20 and 15⁰C respectively, atmospheric pressure is 745 Hg mm.
- 2.5. Measure and assess the artificial lighting in laboratory using a proper device.

Variant 3

- 3.1. Methods of studying of the environmental effect on human body and health.
- 3.2. Climate and its hygienic significance. Climate forming and climate characterizing factors. Climatic zones of Ukraine.
- 3.3. Mechanisms of heat exchange and heat loss, their functional particularities in comfortable; cold and hot microclimate.
- 3.4. Sources of the air pollution in residential, public, industrial premises and their hygienic characteristics.
- 3.5. Describe the principle of gas analyzer UG-2 operation. Assess the air pollution using indicating tube and colorimetric ruler prepared by the department.



Topic № 7

METHOD OF HYGIENIC ASSESSMENT OF SOIL ACCORDING TO THE SANITARY INSPECTION OF THE LAND PARCEL, RESULTS OF LABORATORY ANALYSIS OF SAMPLES AND CLEANING OF THE POPULATED PLACES (2 hours)

1. Learning objective

- 1.1. Understand hygienic, epidemic and endemic importance of soil.
- 1.2. Master the methods of sanitary examination of the territory and soil sampling for laboratory analysis.
- 1.3. Master the method of assessment of the soil pollution level and degree of its danger for people's health based on the sanitary examination of the land parcel, and the results of soil samples' laboratory analysis.

2. Basics

- 2.1. You should know:
 - 2.1.1. Hygienic, epidemic and endemic importance of soil.
 - 2.1.2. Indices and the scale for assessment of sanitary condition of soil.
 - 2.1.3. Importance of soil as the medium for domestic and industrial waste treatment.
- 2.2. You should have the following skills:
 - 2.2.1. To carry out the sanitary examination of the land parcel considering its function (territory of child institution, hospital, sewage treatment plant etc.).
 - 2.2.2. To determine sampling points and to take soil samples for sanitary-hygienic, bacteriological and helminthological analyses.
 - 2.2.3. To state a hygienic value of sanitary condition of soil based on sanitary examination of land parcel and results of laboratory analysis.
 - 2.2.4. To forecast approximate the population health level according to degree of soil contamination by exogenous chemical substances (ECS).

3. Self-training questions

- 3.1. Soil, its definition. Hygienic, epidemic and endemic importance of soil.
- 3.2. Main physical properties of soil (texture compound, humidity, porosity, permeability, filtration ability, air permeability, capillarity, moisture) and their hygienic importance.
- 3.3. Main abiotic components of soil (solid substance, soil moisture, soil air), their natural chemical compound and hygienic characteristic.
- 3.4. Soil biocenoses, their classification and hygienic characteristic.
- 3.5. Soil as a factor in transmission of infectious pathogens.
- 3.6. Soil pollution sources, their classification and hygienic characteristic.
- 3.7. Factors and mechanisms that take part in the natural purification of soil.
- 3.8. Usage of soil for treatment of domestic and industrial waste.

3.9. Hygienic characteristic of waste collection procedures (door-to-door-based, neighbourhood-based), removal and processing of solid domestic, industrial and building waste.

3.10. "Pickup" system of collection, removal and processing of liquid waste (cesspool fields, sewage irrigation fields).

3.11. The land parcel sanitary examination procedure considering its functionality.

3.12. Rules, methods and devices for soil sampling and preparation for laboratory analysis.

3.13. Criteria of soil sanitary condition, their classification and hygienic importance.

3.14. Procedure of determination of soil physical and mechanical indices.

3.15. Functional diagram for determination of chemical criteria of soil sanitary state.

3.16. Procedure of detecting eggs of geohelminthes in soil.

3.17. Functional diagram for determination of bacteriological criteria of soil sanitary condition and its pollution.

3.18. Approximate assessment scale of soil pollution level and degree of its danger for people's health.

3.19. Hygienic assessment procedure of soil sanitary condition based on the results of sanitary examination of the land parcel and laboratory analysis of the samples.

4. Self-training assignments

In the outskirts of a settlement a parcel of 3 ha of former cultivation area is assigned for construction of a new boarding school. During the sanitary examination of the parcel, no sources of pollution were discovered. However, the ground could be contaminated by chemical fertilizers and pesticides when it was used for agricultural needs. The relief has a slope in the southern direction. At the distance of 20 m from the northern border of the parcel an unequipped dump of domestic waste was found, which is at the distance of 100-130 m from the people houses. In the center of the parcel soil sample of 40×20 m² size was taken by "envelope" technique. 1 kg of soil was taken at each sampling point.

Laboratory analysis data:

Soil physical properties: physical sand (particles of the size bigger than 0.01 mm) – 85%, foreign impurities – up to 9%.

Pollution indices of exogenic chemical substances: dichlorodiphenyltrichloroethane (DDT) (amount of isomers) – 0.05 mg/kg (MAC – 0.1 mg/kg), hexachlorobenzene (HCB) – 0.01 mg/kg (MAC – 0.1 mg/kg).

Sanitary-chemical criteria of epidemic safety: ammonia nitrogen – 45 mg/100 g, organic nitrogen – 0.6 mg/100 g, nitrites – 0.5 mg/100 g, nitrates – 3.3 mg/100 g, chlorides – 75 mg/100 g, Khlebnikoff's sanitary number – 0.78.

Sanitary microbiological criteria of epidemic safety: microbial number – 5×10^5 , when titer is 0.01, titer of anaerobes is 0.001, eggs of helminthes – 7 in 1 kg of soil, number of larvae and chrysalides of flies – 5 on 0.25 m².

Draw up a valid report about sanitary condition of soil and make recommendations concerning the assignment of the parcel for school building.

(When solving a situational task one should use norms and standards given in Appendices 3 and 5 and recommended literature).

5. Structure of the lesson

This is seminar and laboratory lesson. The first part of the lesson is devoted to theory (Appendices 1-6) and analysis of a situational task solution. The first part of the lesson is concluded with demonstration of the equipment for soil sampling and the equipment, which is used for laboratory analysis of soil samples (earth drilling machines, kit of Knopff sieves, Schuttel apparatus, centrifuge, diaphragm-type filter, Zeits filter holder, Goldman watering-can), object-plates with samples of eggs of helminthes. At the second part of the lesson, students are introduced into the procedure of soil hygienic assessment on the bases of data of sanitary examination of the land parcel and laboratory analysis of soil samples (Appendix 7). Example of a situational task for its active discussion by students during the study is given in the Appendix 8.

6. Equipment required for the lesson

1. Equipment for soil sampling (scoop, wand).
2. Knopf sieves (7 numbers).
3. Graduated cylinder for 100 ml.
4. Tables: - Soil classification by texture of soil;
 - Soil sanitary state criteria;
 - Soil condition according to Khlebnikoff's sanitary number.
5. Situational tasks based on the results of soil laboratory analysis.



Topic № 8

TECHNIQUE OF THE SANITARY INSPECTION OF WATER SUPPLY SOURCES FOR BACTERIOLOGICAL AND SANITARY-AND-CHEMICAL ANALYSIS. METHOD OF ASSESSMENT OF DRINKING WATER ACCORDING TO RESULTS OF LABORATORY ANALYSIS OF SAMPLES (2 hours)

1. Learning objective

Master the technique of sanitary inspection of water supply sources and water sampling for bacteriological and sanitary-and-chemical analysis.

Acquire the method of the analysis reading and drinking water quality assessment for local and centralized water supply.

2. Basics

2.1. You should know:

2.1.1. Hygienic significance of water (physiologic, endemic, epidemiological, toxicological, balneal, economical and domestic).

2.1.2. Classification of water supply sources and their hygienic characteristics.

2.1.3. Programme of sanitary inspection of water supply sources: sanitary-and-topographic, sanitary-and-technical, sanitary-and-epidemiological.

2.2. You should have the following skills:

2.2.1. To carry out sanitary inspection of water supply sources.

2.2.2. To define sampling places and obtain water samples for analysis, to know how to fill in an accompanying form.

2.2.3. To define the discharge (output) of water supply sources.

2.2.4. To state a hygienic value of drinking water quality according to results of sanitary inspection of the source of water supply and results of the laboratory analysis of water.

3. Self-training questions

3.1. Classification of natural water supply sources, conditions of water generation in them and their comparison.

3.2. Basic hygienic requirements for centralized domestic and drinking water supply sources.

3.3. Field of application and basic regulations of State Standard 400-12.05.2010 «Centralized domestic and drinking water supply sources. Hygienic, technical requirements and selection guidelines».

3.4. Classification of methods of water quality improvement when using centralized water supply system.

3.5. Hygienic assessment of water clarification and decolouration. The essence of coagulation, precipitation and filtration (penetration). Facilities used for this purpose.

3.6. Sanitary protection zones of water supply sources, their purpose, peculiar regime characteristics.

3.7. Procedure of the sources selection of centralized domestic and drinking water supply.

3.8. Sources, causes and mechanisms of the ground and surface reservoirs pollution. Hygienic characteristic of domestic and residential waste waters as the main source of the surface water reservoirs pollution.

3.9. Self-purification (natural purification) of water in open reservoirs, its essence and hygienic significance, self-purification indices.

3.10. Wastewater purification as the procedure for sanitary control of water reservoir pollution.

3.11. Methods of sanitary inspection of water objects. Hygienic significance of certain elements of sanitary inspection (sanitary-and-topographic, sanitary-and-technical, sanitary-and-epidemiological).

3.12. Methods of determination of water volume and discharge (output) of water supply sources.

3.13. Guidelines, equipment and glassware used for water sampling from open water reservoirs, artesian wells, water supply networks, shaft wells, water catchments for sanitary-and-chemical and bacteriological analysis.

3.14. Waterborne infectious diseases. Peculiarities of waterborne epidemics, their prophylaxis.

3.15. Diseases of noninfectious origin, which are caused by use of poor quality water and methods of their prevention.

3.16. Problem of waterborne macro- and microelementoses of water origin. Hygienic importance of water hardness. Endemic fluorosis and its prevention.

3.17. Endemic caries. Fluorine prophylaxis of caries and its importance in practice of centralized water supply.

3.18. Water-nitrate methemoglobinemia as a hygienic problem, its prevention.

3.19. General hygienic regulations on the drinking water quality, their indices physical, organoleptic, indices of natural chemical composition, their hygienic characteristic. State standard of drinking water.

3.20. Sources and criteria of water pollution and epidemiologic safety of water – organoleptic, chemical, bacteriological, their hygienic characteristic.

3.21. Comparative characteristic of centralized and decentralized water supply systems. Sanitary protection zones.

4. Self-training assignments

4.1. A well, made from cement rings, has 1.2 m in diameter. The water surface in the well is at the depth of 20 m, the well itself is 25 m deep. After pumping for 15 minutes, the water level in the well lowered by 0.5 m, it restored 20 minutes after the pumping was finished. Find out: a) water volume in the well; b) well discharge.

4.2. Find out water discharge (output) in the 8 m wide river, with the deepest point of 1.5 m and current velocity (measured using the float) of 1 m per 20 sec.

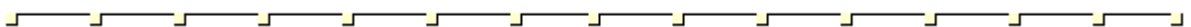
5. Structure of the lesson

This is a laboratory lesson. If it is possible the study is carried out in immediate proximity to water source (river, lake) or shaft well, or water catchment. If the lesson takes place in the training laboratory, students solve situational tasks. After examination of the level of the knowledge of the students and discussion of theoretical questions on the topic (appendix 1), each student (or pair of students) obtains a situational task, topographic map or situational layout to it and a simulated water sample, which was prepared by the department, performs sanitary inspection of water supply source (appendix 2) and obtains water samples from water tap (appendix 3). In addition to that they determine and assess (see appendix 4) several water quality indices that can be found immediately at the water source, fill in the accompanying form. The task and its solution are written down in the protocol.

Later, each student receives the individual situational task with sanitary inspection data and results of the laboratory analysis of water and draws up sanitary certificate by oneself using technique and Standards given in Appendix 5.

6. Equipment required for the lesson

1. Bathometers, glassware for water sampling for chemical and bacteriological analysis.
2. Hygienic regulations and State Standards of water quality in water supply sources.
3. Formulas for calculation of discharge (output) of water supply sources.
4. Situational task for the water supply source selection.
5. “Drinking water” State Standard, Sanitary Rules and Norms (SRandN) on water of decentralized water supply.
6. Situational tasks on the results of the laboratory analysis of water for students’ self-training and the example of sanitary certificate.



Topic № 9

METHODS AND FACILITIES OF CLEANING, DISINFECTION OF WATER AT THE CENTRALIZED AND DECENTRALIZING WATER SUPPLY SOURCES (2 hours)

1. Learning objective

Acquire the Standard methods of water purification for centralized water supply system (coagulation, precipitation, and filtration), their essence and facilities that are used for this purpose.

Master methods of water disinfection, their classification, hygienic characteristic.

2. Basics

2.1. You should know:

2.2.1. Hygienic indices and standards of drinking water quality (physical, organoleptic, chemical composition) and pollution indices (chemical, bacteriological – both direct and indirect), their scientific substantiation.

2.1.2. Concept and characteristics of centralized (domestic and drinking water pipeline) and decentralized (wells, groundwater intake structures, catchments) water supply systems.

2.2. You should have the following skills:

2.2.1. To state a hygienic value of different methods of water quality improvement and exploitation efficiency of individual structures and facilities, used for this purpose.

2.2.2. To elaborate the complex of measures to improve water quality and to prevent diseases caused by poor water quality.

3. Self-training questions

3.1. Classification of methods of water quality improvement when using centralized water supply system.

3.2. Hygienic assessment of water clarification and decolouration. The essence of coagulation, precipitation and filtration (penetration). Facilities used for this purpose.

3.3. Methods of water disinfection, their classification and hygienic characteristic.

3.4. Comparison of the water chlorination methods. Chlorinated reagents that are used for water disinfection. Mechanism of their bactericidal action. Disadvantages of chlorination.

3.5. Water disinfection using ozonation and ultraviolet radiation, their hygienic characteristic.

3.6. Water disinfection efficiency indices at waterworks when using centralized domestic and drinking water supply.

3.7. Special methods of water quality improvement, their essence and hygienic characteristic (desalination, softening, deferrization, fluorination, defluorination, degassing, deactivation).

3.8. Standard methods of water purification for centralized water supply system (coagulation, precipitation, filtration), their essence and facilities that are used for this purpose.

3.9. Methods of water disinfection, their classification, hygienic characteristic.

3.10. Methods of sanitary inspection of centralized water supply systems (preventive and regular). Types of laboratory analysis of water – bacteriological, sanitary and chemical analysis (short and complete).

3.11. Sanitary inspection of local water supply systems. Equipment and exploitation of wells, groundwater intake structures (catchments). “Sanation” of wells.

3.12. Methods of analysis “reading” and expert assessment of drinking water quality.

4. Self-training assignments

4.1. To solve a following problem: water is taken from the shaft well, which depth from ground surface to water surface is 14 m. Log cabin is made of wood. The well is equipped with an open shed, a cover, a winch with a common dip-bucket. A plot that surrounds the well is clean and there is a fence around it. Sample of water is sent to the laboratory on the 20-th of June of current year, water is sampled into two glass vessels to make sanitary and chemical analysis and bacteriological analysis. Water samples are sealed up; the accompanying letter with information about the state of the well and sampling conditions is attached.

The results of laboratory analysis of water samples are the following: transparency – 30 cm according to standard font, colour – 40° according to the scale of potassium dichromate; odour at water temperature equal to 20° and 60°C – is absent (1 point); aftertaste strength – 0 points; sediment – absent; solid residue – 400 mg/l; pH – 7.5; total hardness – 9 CaO mg-equiv/l; total iron – 0.25 mg/l; sulphates – 80 mg/l; fluorine – 1.2 mg/l; chlorides – 82 mg/l; ammonium nitrogen – 0.1 mg/l; nitrite nitrogen – 0.002 mg/l; nitrate nitrogen – 20 mg/l; microbial number – 200 CFU/cm³; CBGB index – 4 CFU /cm³. Assess the water quality of the well and decide whether water in this well is good for domestic and drinking purposes (see Appendix 4).

4.2. To draw up sanitary certificate of water sample taken from water supply network. The results of the laboratory analysis of water sample are the following: transparency – more than 30 cm according to Snellen scale; colour – 20° according to the standard scale of potassium dichromate; odour and aftertaste – not exceeding 2 points; sediment – absent; turbidity (suspended materials concentration) – 2 mg/l; solid residue – 200 mg/l; iron total – 0.7 mg/l; sulphates – 96 mg/l; chlorides – 34 mg/l; fluorine – 0.8 mg/l; ammonium nitrogen – 0.28 mg/l; nitrate nitrogen – 10 mg/l;

nitrite nitrogen – 0.001 mg/l; total hardness 6.3 CaO mg-equiv/l; microbial number – 92 CFU /cm³; coli index – 3 CFU/cm³ (see Appendix 3).

5. Structure of the lesson

This is the seminar lesson. After the formal procedure the teacher checks the level of theoretical knowledge of the students asking questions based on the ones for self-training and of Appendix 1 listed above. Then the teacher professes the technique of water analysis “reading” to the students using one of the situational tasks prepared preliminary by the department personnel as an example, and involving the students. According to results of situational problem discussion the students draw up comprehensive sanitary certificate, using Standards given in Appendices 3, 4.

Later, each student receives the individual situational task with sanitary inspection data and results of the laboratory analysis of water and draws up sanitary certificate by oneself using technique and Standards given in Appendix 5.

6. Equipment required for the lesson

1. “Drinking water” State Standard, Sanitary Rules and Norms (SRandN) on water of decentralized water supply.
2. Situational tasks on the results of the laboratory analysis of water for students’ self-training and the example of sanitary certificate.



CONCLUDING LESSON ON SECTION «MUNICIPAL HYGIENE»

1. Learning objective

Checkup of students' knowledge, practical skills and acquirements learnt from "Municipal hygiene" section.

2. Basics

2.1. You should know:

2.1.1. Physiological, hygienic, endemic and epidemiological significance of water.

2.1.2. Hygienic characteristics of different water supply sources.

2.1.3. Characteristic of centralized and decentralized water supply systems.

2.1.4. Types, methods and means of water supply and water treatment.

2.1.5. Methods and devices of medical control of water supply of settlements.

State standards and hygienic regulations on water.

2.1.6. Hygienic, sanitary and epidemiological importance of soil. Sanitary state characteristic of soil.

2.1.7. Methods and devices of sanitation of settlements from liquid and solid waste using flush and pick-up removal systems.

2.1.8. Methods and devices of sanitary control of sanitation objects in settlements.

2.2. You should have the following skills:

2.2.1. To carry out sanitary examination of municipal objects of sanitation and to give their description, to take water and soil samples for analysis.

2.2.2. To draw sanitary conclusion and preventive recommendations about condition of municipal objects based on assessment of results of sanitary examination and laboratory analysis of samples.

3. Self-training questions

3.1. Physiological, hygienic and national economical importance of water.

3.2. General specification of water quality of natural sources of water supply (organoleptic characteristics, indices of chemical composition, radiation and epidemiological safety, water physiological value).

3.3. Classification of natural water sources, conditions of water forming in them and their comparative hygienic characteristic.

3.4. Sources, reasons and mechanisms of pollution of surface and ground waters. Use of water reservoirs for treatment of domestic and industrial sewage.

3.5. Self-purification of water in open-air water reservoirs, its nature and hygienic importance, self-purification factors. Sewage treatment.

3.6. Hygienic regulations and State standards for water quality in water reservoirs, sphere of their circulation, regulation principles.

3.7. Water quality organoleptic characteristics, methods of their determination and units of measurement.

3.8. Chemical characteristics that specify compound of natural water, methods of their determination and measurement units.

3.9. Bacteriological characteristics of water quality (direct – pathogenic organisms and sanitary-indicative – microbial number, coli titer, coli index), methods of their determination and hygienic regulation.

3.10. Hygienic importance of separate elements of water objects sanitary examination (sanitary-topographic, sanitary-technical, sanitary-epidemiologic).

3.11. Rules, methods and devices for taking water samples for analysis from open reservoirs, wells, ground water intake structures and at centralized water-supply systems. Covering letter, its content, rules of processing.

3.12. Methods of determination of the water supply sources (wells, intake structures, rivers) discharge (output).

3.13. Quality and quantity of drinking water and water-supply conditions effect on the population health and sanitary living conditions.

3.14. Water-supply standards at centralized and decentralized systems; their scientific substantiation.

3.15. Infectious diseases, pathogens of which are transferred through water (waterborne infectious diseases). Characteristics of water epidemics, their prevention.

3.16. Geo- and biohelminthiases, protozoa and other pathogens that transmit infection through water of open-air reservoirs.

3.17. Diseases of infectious origin that are caused by use of poor quality water and their prophylactic.

3.18. Macroelements of water and their health effect. Hygienic importance of water hardness. Nitrate induced methemoglobinemia.

3.19. Problem of microelementoses of water origin (fluorine, iodine, selenium, molybdenum etc.), types of pathology they cause, their prophylaxis.

3.20. Endemic fluorosis, endemic caries, endemic goitre. Contribution of Ukrainian hygienists to scientific substantiation of their prophylaxis.

3.21. Water fluorination and defluorination as caries and fluorosis prophylactic. Dependence of water fluorination from locality climate.

3.22. General hygienic specification of drinking water quality, its factors - organoleptic, chemical composition indices, their hygienic characteristics.

3.23. Drinking water State standard. Drinking water quality hygienic specification in case of decentralized water supply.

3.24. Comparative hygienic characteristic of centralized and decentralized water-supply systems.

3.25. Water-pipe elements at diversion flow from artesian wells and open water reservoirs. Areas of sanitary control.

3.26. Conventional methods of water purification in case of centralized water-supply system (coagulation, flocculation, precipitation, filtration), substances and utilities that are used for this purpose.

3.27. Methods of water disinfection, their classification and hygienic characteristic.

3.28. Water chlorination, its methods and reagents that are used for this purpose. Disadvantages of chlorination.

3.29. Ozone treatment, ultraviolet disinfection of water, their comparative hygienic characteristic.

3.30. Special methods of water quality improvement (desalination, defluorination, deodorization etc.), their substance, hygienic characteristics.

3.31. Methods of sanitary inspection of centralized water supply systems (preventive, regular). Types of laboratory analysis of water – bacteriological, sanitary-chemical (short, complete, special).

3.32. Sanitary inspection of local water supply systems. Equipment and maintenance of shaft wells, water source intake structures (catchments). Sanitation of shaft wells.

3.33. Technique of reading of quality analyses of drinking water.

3.34. Soil. Definition, hygienic, endemic and epidemiological importance.

3.35. Physical and chemical properties of soil (texture of soil, moisture, porosity, permeability, capillarity, natural chemical composition of soil and its air components).

3.36. Biocenoses of soil, their classification, hygienic characteristic (microbes, viruses, fungi, larva of insects, worms etc.).

3.37. Soil as a source of infectious diseases: tetanus, gas-gangrenes, geohelminthoses etc.

3.38. Economic, industrial, transport and other sources of soil pollution, their classification, hygienic characteristic.

3.39. Factors and mechanisms that participate in soil self-purification.

3.40. Use of soil for economic and industrial waste disposal.

3.41. Hygienic characteristic of methods of collection (door-to-door-based, neighborhood-based), disposal, destruction of solid waste of residential, industrial, building origin (improved dumps, grounds, compost fields, utilization and biothermal facilities).

3.42. Pick-up system of waste collection, disposal and treatment (cesspool fields, sewage irrigation fields).

3.43. Rules, methods and techniques of soil sampling, analysis of physico-mechanical, sanitary-chemical, bacteriological, helminthological factors. Drawing up of covering papers.

3.44. Hygienic assessment of soil based on results of sanitary examination of the parcel and laboratory analysis of samples.

3.45. Soil sanitary state indices, their scientific substantiation (texture, physicochemical indices, microbial number, coli titer, anaerobic titer etc.).

3.46. Method of determination of physicochemical indices of soil.

3.47. Principal diagram for determination of chemical criteria of soil sanitary state.

3.48. Elementary scheme for determination of bacteriological criteria of soil sanitary state and pollution.

4. Self-training assignments

4.1. To repeat and fix knowledge of “Municipal hygiene” section in the scope of listed above (item 3. self-training questions).

4.2. To learn examples of student’s individual tasks for the final lesson, solve situational assignments (appendix 1).

4.3. To recollect the usage order of devices or methods of environmental factors measurement that were learnt on each lesson of “Municipal hygiene” section using all appropriate instructions, given in appendices to lessons, manuals and study protocols. (For recollection of attainments and device usage skills, it is reasonable to attend the tutorial at the department, held by the teacher on duty or in the laboratory).

5. Structure and content of the lesson

Concluding lesson (2 academic hours) is carried out in study laboratories of the department, equipped with appliances and devices for all topics of practical lessons of “Municipal hygiene” section.

Each student is given an individual test, which consists of 3-4 theory questions, a situational task, and practical work of measurement of one or another index or factor from this section. Theory answers and situational task solutions are given in written form or in the form of programmed or computer control, prepared by the department. For this task half of the session is reserved (45 min.).

Another half of the lesson (45 min.) is carried out in verbal form, by cross – quizzing of students, discussion and correction of their wrong answers, explanation of tasks and practical skills of device usage.

According to concluding lesson results marks are put into student attendance register. Students must re-sit unsatisfactory marks in non-study time.

6. Literature

6.1. Principal:

6.1.1. Hygiene and human ecology. Manual for the students of higher medical institutions/ Editor prof. V.Bardov. – Kiev, 2008. – 720 p.

6.1.2. General hygiene and environmental health. Manual for the students of high medical schools/ Editor prof. M. Nadvorny – Odessa, 2005. – 242 p.

6.2. Additional:

6.2.1. General hygiene and medical ecology. Textbook for student’s medical faculty/ Editor prof. S.Shibanov. – Simferopol, 2004. – 540 p.

7. Equipment required for the lesson

1. “Drinking water” State Standard, Sanitary Rules and Norms (SRandN) of water of decentralized water supply.

2. Equipment and instruments for appropriate studies of the section for check of hygienic investigation attainment and skills.

3. Situational tasks and sums for check of students’ knowledge, attainment and skills on section “Municipal hygiene”.

Examples of tests

Variant 1

1. Physiological, hygienic, endemic, epidemiological importance of water.
2. Soil self-purification and factors that cause it.
3. Situational task: To make a decision concerning quality of potable tap water on the basis of its laboratory analysis results: water clarity – 28 cm according to Snellen scale; chroma – 20^0 according to standard chrome cobalt scale; odour and after-taste – below 2 points; sediment, opalescence – are absent; suspended materials concentration – 2 mg/l; dry residue 200 mg/l; iron total – 0.7 mg/l; sulphates – 280 mg/l; chlorides – 170 mg/l; fluorine – 1.2 mg/l; total hardness 6.5 mg-equivalent/l; microbial number – 95; coli-index – 3.
4. Fill in (de bene esse) the accompanying form of water sample from artesian well, which was taken for sanitary-chemical and bacteriological analyses.

Variant 2

1. Methods and devices of domestic sewage purification in collecting system.
2. Sanitary-hygienic and epidemiological importance of soil.
3. Situational task: to make a sanitary conclusion concerning suitability of the parcel for building of kindergarten on the basis of sanitary examination results and laboratory analysis of samples: the parcel is located on the territory of a former farmstead (plough-land of a vegetable garden, farm-yard, former – at present filled up with ground toilet place). Buildings of former farmstead are pulled down. Opposite farmsteads are fully functioning. Laboratory analysis data: soil - air -, non-watertight, sandy clay. According to chemical compound (for 100 g of weight): ammonia nitrogen 4.5 mg (3.8 mg reference value); organic nitrogen 0.6 mg (0.2 mg reference value); nitrites 0.5 mg (0.1 mg reference value); nitrates 3.3 mg (2.9 mg reference value); chlorides 75 mg (65 mg reference); Khlebnikoff's sanitary number – 0.68; microbial number 5×10^4 ; coli-titer 0.01; anaerobic titer 0.001; eggs of geohelminthes 7 on 1 kg of soil.
4. Define water pH using universal indicator and standard scale.



Topic 10

METHOD OF CALCULATION OF HUMAN ENERGY SPENDING AND ITS REQUIREMENTS IN NUTRIENTS. ASSESSMENT OF NUTRITION ADEQUACY USING THE MENU-SCHEDULE (2 hours)

1. Learning objective

Master the methods of medical control of the energy expenditure and nutrition in different social and professional, sex and age population groups

2. Basics

2.1. You should to know:

2.1.1. Physiological basics of metabolism in the human organism.

2.1.2. Energy metabolism and its regulations. Constituents of the daily energy expenditure.

2.1.3. Physiological and hygienic characteristic of the basal metabolism and specific-dynamic effect of food.

2.1.4. Dependence of the human energy metabolism on climate and weather conditions, microclimate, emotional stress and physical load.

2.1.5. Rational nutrition as a basis of the sufficient energy supply for the human organism.

2.2. You should have the following skills:

2.2.1. To monitor the daily activity of the individual or a group with similar daily routine and nutrition.

2.2.2. To use directive, reference materials, formulas, tables, nomograms, perform the necessary calculations (analyses).

3. Self-training questions

3.1. Physiological basics of energy and plastic metabolism in organism.

3.2. Physiological significance and main functions of the nutrition.

3.3. Concept of the rational nutrition as a basis of energy and plastic metabolism in human organism.

3.4. Characteristic of different population groups depending on the energy expenditure. Scientific background of the physiological standards of nutrition for different sex and age, professional population groups.

3.5. Daily energy expenditure of human organism and its main constituents.

3.6. Doctor's duties concerning the medical control of the energy expenditure and nutrition for different population groups, organized collectives.

3.7. Significance of the rational nutrition to health protection and improvement.

3.8. Classification of nutrients and their functions in the organism (energetic, plastic, catalytic, protective).

3.9. Methods of determination of the human energy expenditure.

3.10. Method of calculation of the human energy expenditure using the anthropometric and time-keeping data.

4. Self-training assignments

4.1. A 40-year old woman is the tutor in the humanitarian university. Determine the intensity group of her labor, physical activity coefficient (PhAC), daily energy expenditure, requirements in main nutrients (proteins, fats, carbohydrates, vitamins B, C and A, minerals /iron, calcium, phosphorus/), optimal dietary intake.

4.2. The 30 years old man of 175 cm height, 70 kg body weight is the surgeon by profession. His daily chronogram is the following: professional activity (performing operations) – 4 hours, preparation to operations – 1.5 hours, preparation and conduction of the medical conference – 2.5 hours, walking – 1 hour, active physical exercises – 30 min., self-service – 2.5 hours, reading – 1.5 hours, public activity – 1 hour, rest by seating – 2 hours, laying – 1 hour, sleeping – 8 hours. Calculate the actual basal metabolism using equations, daily energy expenditure [according to the relative basal metabolism (RBM) – the type activity duration and physical activity coefficient (PhAC)], nutrient requirements (see p.4.1.1.).

The student has to learn in detail the appendices and recommended literature for exercise solution.

5. Structure and content of the lesson

This is a 2 hour laboratory lesson. The incoming students' knowledge is checked during the first part of the lesson, questions 3.1-3.11 and performance of self-training tests are studied in detail. The students solve the situational tasks (prepared by the department) on the energy expenditure in organism and its requirements in nutrients according to the profession, age, sex and "Norms of physiological requirements the population of Ukraine in main nutrients and energy" (1999) and using the anthropometric and time-keeping data (appendices # 1 - 8) during the second part of the lesson.

The received results are compared, corrected, the mistakes during the task solution are indicated, and the energy expenditure and main nutrients are divided on separated food intakes depending on the recommended schedule.

6. Equipment of the lesson

1. Table: Physical activity coefficients for different types of activity.
2. Table: Daily energy expenditure of adult population without physical activity (basal metabolism).
3. Table: Groups of able-bodies citizens depending on the physical activity.
4. Table of Harris and Benedict for basal metabolism determination using the anthropometrical indices.
5. Table: The energy expenditure for separate types of activity.
6. Students task for self-training for determination of the energy expenditure and calculation of the requirements in nutrients and energy.



Topic 11

METHOD OF STUDY AND ASSESSMENT OF THE HUMAN NUTRITIONAL STATUS AND MEDICAL CONTROL OF VITAMIN SUFFICIENCY IN THE ORGANISM (2 hours)

1. Learning objective

1.1. Master the human nutritional status research and assessment methods as a measure of detection and prevention of health disturbances caused by malnutrition.

1.2. Master the methods of detection and assessment of the vitamin sufficiency in the organism and the methods and measures of hypo- and avitaminosis prevention.

2. Basics

1.1. You should know:

1.1.1. The rational nutrition principles and conditions.

1.1.2. The factual nutrition assessment methods among different social and professional, age and sex population groups.

1.1.3. Research and assessment methods of nutritional state as the complex medical control of both the organized collectives' and individuals' nutrition.

1.1.4. Classification and physiological significance of the vitamins in the organism.

1.1.5. The most frequently occurring hypovitaminosis states in cases of both individual and collective nutrition. Their causes.

1.1.6. Avitaminosis and their clinical characteristics.

1.1.7. Causes of the hypovitaminosis development.

1.2. You should have the following skills:

1.2.1. To detect and assess signs of inadequate nutrition among individuals and in organized collectives with the similar day regimen and dietary patterns using the somatoscopic, somatometric, physiometric, clinical and biochemical indices.

1.2.2. To diagnose the human health disturbances and diseases of alimentary origin.

1.2.3. To detect the hypo- and avitaminosis in cases of both individual and collective nutrition.

1.2.4. To organize the hypovitaminosis prevention measures and assess their effectiveness.

3. Self-training questions

3.1. The rational nutrition concepts, principles and conditions.

3.2. The human nutritional status definition and indices.

3.3. The indices of plastic and energetic adequacy of nutritional status (weight and height Brock, Kretz indices, Quetelet index, subcutaneous fat thickness).

3.4. The protein adequacy indices of the organism nutritional status.

3.5. The organism nutritional status adipose and carbohydrate adequacy indices. The inedible carbohydrates sufficiency signs in the organism.

3.6. The macro- and microelements and vitamins sufficiency signs and indices.

3.7. The human nutritional status biochemical indices.

3.8. The method of medical control of human nutritional status.

3.9. Vitamins as a human dietary intake component, their classification, physiological significance in organism.

3.10. The most frequent hypovitaminosis states in cases of both individual and collective nutrition and their causes.

3.11. Symptomatic, clinical and biochemical signs of the hypovitaminosis C, its diagnostic functional tests. Hypovitaminosis A, B, methods of its detection.

3.12. Main sources of water-soluble and liposoluble vitamins.

3.13. Prevention methods and measures of hypovitaminosis. The influence of the storage conditions, foodstuff culinary handling, and sale conditions on preservation of the vitamins in them.

3.14. Comparative hygienic characteristics of the natural and artificial vitamin medical preparations as hypovitaminosis prevention measures.

4. Self-training assignments

4.1. The 35 year-old female of 160 cm height and 88 kg weight is the chief cook in the district hospital nutrition block. Her thorax girth is 118 cm, waist girth is 130, pelvis girth is 168, and the middle part of the hip girth is 85cm.

The subcutaneous fat thickness beneath the scapula is 3.4 cm, on the middle of the shoulder is 4.3 cm, and abdomen lateral surface is 5.1 cm. She says that she suffers from the lack of breath, tries not to eat so much but has often to taste the meals, which she cooks. She doesn't do physical exercises and spends the whole day standing on her feet. She suffers from the lower extremities varix dilatation.

Calculate the weight and height and other indices, draw the sound conclusion of the chief cook's nutritional status, come up with the health improving recommendations.

4.2. A second year medical university student who is 21 years old has the height of 170 cm, body weight of 55 kg, 81 cm thorax girth, 97 cm pelvis girth, 55 cm waist girth, 48 cm middle hip girth, subcutaneous fat thickness: beneath the scapula – 1.3 cm, behind the shoulder middle – 1.1 cm, abdomen lateral surface – 2.2 cm, thorax lateral surface – 1.0 cm.

During examination the following symptoms were determined: the skin, conjunctiva, lip paleness and dryness; nail cyanosis, fragility and their spoon-shaped form; general weight loss; wrinkly face; hair fragility and loss. The weakness increase, working capacity decrease, rapid fatigability, sleepiness, headaches, extremities numbness sensation and so on, have also been found during the examination.

Calculate the necessary indices, make the student's nutritional status assessment, give your recommendations to her. Use appendices to this topic and recommended literature for the task solution.

4.3. The substantial part of the students of mining industrial complex college complain on the work capacity decrease, muscular weakness, rapid fatigability, photophobia, eye colic during the routine physical examination. They explain such symptoms as being caused by the decreased illumination at the working places in the mine. The students do not complain on the canteen nutrition even if asked about it. The pale, dry skin, hair follicle keratinization, especially on elbows and knees, hardened skin on the heel even sometimes with fissures, acne formation, nails striation are observed on a lot of students objectively.

The signs of what disease may be suspected after medical examination of the students? What methods of deep examination must be used for diagnosing?

4.4. The student of the medical university also works as a nurse (night duties at the clinic) at the non-study time. She is suffering from the tiredness, constant fatigability, irritability, excessive sleepiness, poor progress in studies. The student says that she has good nutrition, eats sausages, canned goods and other increased cost products. She has no time for cooking hot meals and does not like visiting canteens. The doctor pays attention to bruises on the hands and knees, nose, lips, gums, nails cyanosis, skin paleness and dryness.

What disease is this girl suffering from? What examinations must be performed to verify or change the diagnose?

5. Structure and content of the lesson

This is the laboratory lesson. At the beginning of the lesson (during 45 minutes), students knowledge will be checked by teacher's questioning and explanation. The theoretical questions of the topic (methods and indices of the nutritional status medical assessment of the individual or collective with the similar day regiment or nutrition) will be the next step.

In the second part of the lesson, each student performs the nutritional status assessment in accordance to the complex indices (somatoscopic, somatometric, physiological, clinical, biochemical) on each other, or using the pre-made conditions.

Each student has to research and assess the nutritional status of the patient, individually assigned to him (at the therapy, surgery or other department) for knowledge improvement. The student demonstrates the patient's nutritional status description to the teacher and receives the mark for this work.

This is a laboratory lesson, consisting of 2 academic periods. The students have to have their knowledge of basics checked, answer the self-training questions and perform the exercises. After that the theoretical questions of this topic are discussed using students' quiz and tutor's explanations (45 min.).

At the second period the students determine clinical and physiological signs of the vitamin sufficiency in organism on each other in accordance to the appendixes 1, 2, 3. Then they make corresponding conclusions, give recommendations on the preventive measures against hypovitaminosis. This work has to be written down in the protocol.

6. Equipment required for the lesson

1. Tape-measure (centimeter).
2. Scales for measuring the body weight.
3. V.I. Vorobyov's nomogram for the height and weight index determination.
4. Hand and torso dynamometers.
5. Anthropometer.
6. Thickness meter divider.
7. The table: The nutrient insufficiency clinical symptoms.
8. Self-study students' tasks (nutritional status determination and assessment of each other).
9. Tilmans reagent (2,6-dichlorophenol-indophenol), 0,06% solution, 8-10 ml.
10. Micropipette on 0,1 ml.
11. Stop watch.



Topic 12

METHOD OF EXPERT ASSESSMENT OF FOOD PRODUCTS AND READY MEALS ACCORDING TO THEIR LABORATORY ANALYSES (2hours)

1. Learning objective

Master the methods of assessment of food products quality and freshness according to their organoleptic criteria and laboratory analyses results

2. Basics

2.1. You should know:

2.1.1. Organoleptic criteria of food products quality and freshness.

2.1.2. Principles of hygienic regulation of the food products quality and freshness.

2.1.3. Full-value indices and deterioration indices of main food products.

2.2. You should have the following skills:

2.2.1. To sample the products and ready meals, send them to laboratory analyses, fill in the accompanying form.

2.2.2. To assess the organoleptic quality and deterioration indices of food products.

2.2.3. To use the State Standards and other normative documents during the assessment of the results of food products and ready meals laboratory analyses. To make the expert conclusion according to these results.

3. Self-training questions

3.1. Food products and their classification, hygienic characteristic.

3.2. State standards and hygienic regulations of food industry products, quality certificates of market products.

3.3. Causes and criteria of food products deterioration.

3.4. Storage conditions of food products, selling terms for unstable products and ready meals.

3.5. Rules of food products culinary processing for saving their high quality, vitamins, gastrointestinal diseases prevention (gastritis, gastric ulcer of stomach and others).

3.6. Quality and deterioration criteria of meat products (beef, pork, mutton, poultry etc.).

3.7. Quality, deterioration and falsification criteria of milk and dairy products (sour cream, kefir, yoghurts, cheeses, butter and etc.).

3.8. Quality and deterioration criteria of bread, bakeries, confectionery, biscuits.

3.9. Quality and deterioration criteria of other grain products (flour, cereals, macaronis, vermicelli etc.).

3.10. Quality and deterioration criteria of canned goods (meat, fish, vegetable and others).

- 3.11. Quality and deterioration criteria of fresh and pickled vegetables.
- 3.12. Food additives, their purpose, hygienic characteristics.
- 3.13. Chemical weed-killers and artificial chemical fertilizers as food product pollutants.
- 3.14. Regulations of sampling of the products for laboratory analyses, filling in the accompanying form, conservation and sealing up to laboratory for dispatching. Drawing up of the act of sample taking.
- 3.15. Drawing the conclusion about food products quality based on the assessment of laboratory analyses results.

4. Self-training assignments

4.1. The patients of neurological and dermatological departments of regional hospital suffer from the insignificant gastrointestinal disorders. The meat used for preparing meals and suspected in causing these disorders was sampled at the nutrition unit for laboratory analyses.

The laboratory analyses results of meat sampling are the following:

- Organoleptic criteria: the meat surface is wet in some places, slightly sticky, darkened. The pit formed by pressure doesn't smoothen well, the meat juice, produced during unfreezing is slightly blurred. The smell is sourish with slight stuffiness. The fat is grayish and sticks to the fingers. The articular surfaces of bones are covered with mucus a little, aren't shiny.

- The broth is slightly blurred during boiling test, becomes turbid after adding the sulfuric acid copper solution and flakes appear. The intensive yellow color appears after adding the Nesler's reagent to the broth filtrate.

Draw an expert conclusion about the meat quality and its possible connection with gastrointestinal disorders of the patients. What additional research must be done?

4.2. Draw an expert conclusion about a portion of the milk sampled at the market with following laboratory research results:

- organoleptic: color is white with cyanotic tint along edges; smell – insignificant, to 2 points; consistence (nail sample) – dense milk with small white grains; taste is a little bitterish (1 point); fat content according to Gerber – 2.2%; acidity – 18° of Terner; density according to the lactometer 1.035 g/cm³ (temperature 20°C); solid residue calculated by Farington's formula - 9%.

What additional research must be done to perform the complete assessment of this milk?

5. Structure and content of the lesson

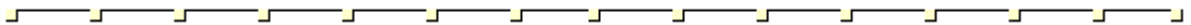
This is a seminary lesson. At the beginning of the lesson students will have their knowledge of basics checked and self-training tasks examined. The questions stated in the paragraph 3 of this topic are studied by the students' quiz and teacher's explanations. The State standards, hygienic regulation on main food products, causes and dynamics of their deterioration, falsification signs are considered in details. The methods of food product preserving, storage rules and culinary processing are studied.

The students consider and assess the situational tasks worked out by the department at the second part of the lesson. The valid expert conclusions are drawn based on the results of organoleptic and laboratory analyses (of main systematically used food products).

The work has to be written down in the protocol.

6. Equipment required for the lesson

1. The samples of certificates, bills and other documents for food product cargos.
2. Food sampling facilities for laboratory analyses.
3. Devices for research of the food products quality and freshness (demonstration to students).
4. The tables of food products chemical composition and caloricity.
5. State standards and hygienic requirements to the main food products.
6. Situational tasks for students' self-training with food products and ready meals laboratory analyses results.



Topic 13

THEORETICAL ASPECTS AND METHOD OF PROPHYLAXIS OF ALIMENTARY DISEASES. HYGIENIC BASICS OF DIETARY TREATMENT AND MEDICAL PROPHYLACTIC NOURISHMENT (2 hours)

1. Learning objective

Master the knowledge on alimentary diseases their etiology, clinic, methods of investigation, general and specific prophylaxis

2. Basics

2.1. You should know:

2.1.1. Examine the classification of alimentary and alimentary caused illnesses.

2.1.2. Origins and prevention of alimentary caused diseases.

2.1.3. Learn the main principles of medical or dietary nutrition.

2.1.4. Examine diates of treatment-and-prophylactic nutrition their features and administration.

2.2. You should have the following skills:

2.2.1. Learn how to determine causes of illnesses and syndromes of insufficient and excessive nutrition.

2.2.2. To detect the alimentary caused diseases and food poisonings, perform the medical measures for their prevention and efficiency assessment.

3. Self-training questions

1. Alimentary and alimentary caused diseases, their classification, etiology, main principles of prevention.

2. Primary diseases of insufficient and excessive nutrition. Mechanism of their development.

3. Characteristic of the main stages of frustration. Prevention of alimentary pathologies.

4. Secondary (alimentary-caused) diseases that connected with violation of processes digestion of nutrients.

5. Conception of disease that connected with alimentary factors of risk and their prevention.

6. Methods of diagnosis and prevention of the alimentary caused diseases with metabolic and deficient genesis.

7. Hygienic principles of prescription treatment-and-prophylactic nutrition.

8. Medical and sanitary control over the organization of nutrition in medical institution.

9. Classification and hygienic characteristics of main medical diets.

10. Medical or dietary nutrition as a method for the treatment and secondary prevention of diseases. Its purpose and principles.

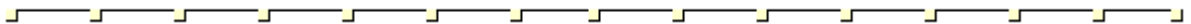
11. Hygienic basics of the nutrition organization in the hospital. The special, clinical, and preventive nutrition.

4. Structure and content of the lesson

The organizational part of the lesson – 5 min. Then test or written control (10 min.) is conducted with followed discussion of basic questions of the topic (15 min.), students take notes in the protocols classification of alimentary diseases and alimentary caused diseases (15 min.). Self practical work (30 min.) consist of solution of situational tasks, where is necessary indicate preventive measures for avoidance alimentary pathology. At the end of the lesson the results of self work are to be discussed and estimated (15 min.).

5. Equipment required for the lesson

1. Table: Classification of alimentary diseases.
2. Table: Classification of alimentary caused diseases
3. Situational tasks for students' self-training



Topic 14

FOOD POISONING. METHODS OF INVESTIGATION OF THE FOOD POISONING CASES (2 hours)

1. Learning objective

Master the knowledge on food poisonings, their etiology, clinic, methods of investigation, general and specific prophylaxis

2. Basics

2.1. You should know:

2.1.1. Definition of “food poisoning” and their classification.

2.1.2. The food poisoning etiology, pathogenesis, clinic and prevention.

2.2. You should have the following skills:

2.2.1. To determine the type of food poisoning, provide the medical help in their cases.

2.2.2. To organize, investigate and determine the cause (food product or meal) of food poisoning.

2.2.3. To organize preventive measures for the elimination of the food poisoning causes and food poisoning prevention.

3. Self-training questions

3.1. Food poisonings, their definition and classification.

3.2. Alimentary toxicoinfections: definition, etiology, diagnostics, clinic, methods of prevention.

3.3. Bacterial toxicosis: botulism, staphylococcal, their etiology, diagnostics, clinic, prevention.

3.4. Mycotoxicosis, their etiology, diagnostics, clinic, prevention.

3.5. Food poisonings of non-microbe origin with:

- products which are toxic by nature;
- products which become toxic due to storage conditions;
- products, contaminated with toxic substances (xenobiotics) – heavy metals, pesticides etc.

3.6. Food poisonings of unknown origin (Kashin-Bek disease etc.), hypotheses of their origins, clinical characteristics.

3.7. Methods of investigation of food poisoning cases, roles and duties of the hygienists and medical doctors. The documents, drawn up during and after the investigation of food poisoning.

3.8. Preventive measures for elimination and prevention of food poisonings.

4. Self-training assignments

4.1. 25 children of 40 have become sick at the end of the day at the summer camp. They suffered from the headache, sore throat, gurgling. Some of them (9 people) complained on nausea, vomiting, periodic pain in abdomen, diarrhea. The

hyperemia of the eyes and throat mucous membrane, body temperature 38-38.5⁰C painful sensation in abdomen during palpation were noted during physical examination.

The following was discovered during the questionnaire of children. Their breakfast consisted of the porridge with sausage and tea; the dinner included such meals as red-beet soup, meat rissoles with potato, fruit compote. The sanitary state of nutrition unit is satisfactory, the medical examination of staff is performed in time. But one of the cooks, that had been absent during one week (“was ill”), has returned to work two days ago.

Determine the presumptive diagnosis, suspected product or meal. Which priority measures must be taken? What documents must be drawn up?

4.2. The family consists of 5 people including 2 children. All family members became sick at once. The doctor of ambulance noted following complaints: the breathlessness, pain in heart and abdomen, weakness of eyesight (“a mist before eyes”), duplication of images, strabismus, nystagmus, troubles during swallowing and speaking, general weakness. The body temperature remains normal. All family members have had the following meals: for breakfast – eggs and tea, for dinner – borsch with pork, fried potato with sausages and pickled mushrooms, fruit compote.

Determine the presumptive diagnosis and suspected product. Which priority measures must be taken? What documents must be drawn up at first and later?

2. Structure and content of the lesson

This is a laboratory lesson. At the beginning of the lesson students will have their knowledge of basics checked and self-training tasks examined. The theoretical questions on this topic according to the paragraph 3 (self-training questions) and recommended literature are studied by the students’ quiz and tutor’s explanations. The sequence of the food poisoning investigation is studied including guidelines and legislative documents which are used during this procedure. The students also have to know the documents drawn up during this procedure and after finishing the investigation (45 min.).

At the second part of the lesson each student (or couple of students) examines the different types of situational tasks about the food poisonings worked out at the department. Then they draw up the necessary documents (according to appendices), make conclusions and preventive recommendations. The work is written down into the protocol.

3. Equipment required for the lesson

3.1. Table: Classification of food poisonings.

3.2. Forms of documents drawn up during the food poisoning investigation (registration form № 58).

3.3. Situational tasks for students’ self-training with description of food poisoning cases.



CONCLUDING LESSON ON SECTION «HYGIENE OF NUTRITION»

1. Learning objective

Check up and assess the knowledge and skills on the “Hygiene of nutrition” section by the students

2. Basics

2.1. You should know:

2.1.1. Physiological and hygienic basics of rational nutrition, medical control methods and facilities for its supplying.

2.1.2. Origins and prevention of alimentary caused diseases.

2.1.3. Conditions and principles of rational nutrition.

2.2. You should have the following skills:

2.2.1. To determine the nutrition adequacy and validity for individuals and organized collectives using the study of organism energy expenditure, nutritional status, factual ration's energetic value and nutrient content.

2.2.2. To detect the alimentary caused diseases and food poisonings, perform the medical measures for their prevention and efficiency assessment.

3. Self-training questions

3.1. Physiological significance, basic functions of nutrition.

3.2. Principles and conditions of the rational nutrition.

3.3. Nutrition as a social and hygienic problem.

3.4. Physiological and hygienic substantiation of rational nutrition for people of different ages, professions, sportsmen.

3.5. Clinical and special nutrition. The physiological norms of nutrition for main groups of population (age, professional and others).

3.6. The physical activity coefficient.

3.7. Physiological and hygienic significance of proteins, fats, carbohydrates for nutrition, their requirements for organism, main sources.

3.8. Functions of proteins, fats, carbohydrates in organism. Problems of protein starvation, obesity.

3.9. Physiological and hygienic significance, function of vitamins, mineral substances, microelements, flavoring agents in organism, their requirements for human organism and main sources. Problems of hypo-, avitaminosis, hypervitaminosis. Biogeochemical endemia.

3.10. Alimentary and alimentary caused diseases, their classification, etiology, main principles of prevention.

3.11. Physiological and psychological organism reactions to partial, full-value starvation, foods and meals quality, food intake conditions. Correlation between the food intake and biological rhythms of organism.

3.12. Food poisonings, their classification, origin, epidemiological particularities.

3.13. Bacterial food poisonings (toxicoinfections, bacterial toxicoses, mycotoxicoses), their origin, basics of prevention.

3.14. Non-bacterial food poisonings, their origin, prevention.

3.15. Food poisonings of unknown origin.

3.16. Medical control methods for nutrition adequacy and validity. The ration balance.

3.17. Methods and criteria of assessment of the nutritional status of individuals or collectives with similar working conditions and nutrition as their nutrition validity signs.

3.18. Energy expenditure of the organism, its components as the base of the ration's caloric content.

3.19. Methods of determination of the energy expenditure. The physical activity coefficient, its dependence from the hardness and intensity of work, social, geographical and climate living conditions.

3.20. Calculation of the organism requirement in nutrients.

3.21. Methods of determination of the ration's caloric and nutrient content – balance, budget, questioning, weighting.

3.22. Laboratory methods of determination of the ration's caloric and nutrient content.

3.23. Calculation methods of determination and assessment of the ration's quantitative and qualitative content according to the menu schedule.

3.24. Caloric and biological value of dairy, meat, fish products, animal proteins and fats.

3.25. Caloric and biological value of bread, grain products, cereals.

3.26. Caloric and biological value of vegetables, fruits, berries, vegetable fats, mono-, di-, polysaccharides.

3.27. Food additives, their classification, hygienic characteristic.

3.28. Methods of food products and ready meals sanitary inspection – organoleptic, sanitary and chemical, bacteriological, helminthological.

3.29. Methods of diagnosis and prevention of the alimentary caused diseases with metabolic and deficient genesis.

3.30. Methods of food poisoning investigation, directive, methodical and legislative documents used during this procedure.

3.31. Catering establishments, their planning, equipment, sanitary and hygienic inspection during their exploitation.

3.32. Hygienic basics of the nutrition organization in the hospital. The special and clinical and preventive nutrition.

3.33. State and departmental sanitary inspection of grocery objects (food industry, food trade, public caterings).

3.34. Sanitary legislation, State standards, hygienic regulations, legislative basics of public catering establishments preventive and regular sanitary inspection.

4. Self-training assignments

4.1. Prepare answers for theoretical questions according to the paragraph 3 of this topic.

4.2. Revise situational task solution methods for each topic of section “Hygiene of nutrition”.

4.3. Revise the legislative, directive and methodical, normative documents and laboratory control devices, which are used during the nutrition sanitary inspection.

5. Structure and contents of the lesson

The written students’ knowledge control is performed at the first period of the lesson. This control includes prepared by the department individual assignments with 2-4 theoretical questions, situational tasks and the legislative document or device description on the hygiene of nutrition.

The selective discussion of some students’ answers with their following analyses, the tutor’s remarks takes place at the second period (25-30 min.) of the lesson.

The mark is set in the academic register based on the written students’ answers. Students have to re-sit their bad marks at off-study time.

6. Literature

6.1. Principal:

6.1.1. Hygiene and human ecology. Manual for the students of higher medical institutions/ Editor prof. V.Bardov. – Kiev, 2008. – 720 p.

6.1.2. General hygiene and environmental health. Manual for the students of high medical schools/ Editor prof. M. Nadvorny – Odessa, 2005. – 242 p.

6.2. Additional:

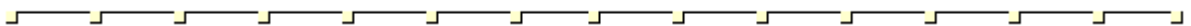
6.2.1. General hygiene and medical ecology. Textbook for student’s medical faculty/ Editor prof. S.Shibanov. – Simferopol, 2004. – 540 p.

7. Equipment required for the lesson

7.1. Tables: The state standards and hygienic demands to main food products.

7.2. Corresponding section lessons equipment and devices for checking up the hygienic researches abilities and skills.

7.3. Situational tasks and assignments to check up the students’ knowledge, abilities and skills of section “Hygiene of nutrition”.



Topic 16

Physiology of labor. Method of hygienic and sanitary assessment of labor intensity and tension for the overwork prevention and increase of working capacity. Method of hygienic assessment of dangerous and harmful factors of the industrial environment and organism response to their impact. Sanitary legislation on labor protection (2 hours)

1. Learning objective

Master hygienic assessment procedure of work intensity and tension for overwork prevention and increase of working capacity

2. Basics

2.1. You should know:

2.1.1. Fundamentals of physiology of physical and mental work, its classification.

2.1.2. Methods of assessment of work intensity and tension.

2.1.3. Methods and technique of labour management and overwork prevention improvement.

2.2. You should have the following skills:

2.2.1. To determine and assess work intensity and tension characteristics and signs of fatigue and overwork.

2.2.2. To recommend rational work and rest conditions at physical and mental work according to their intensity and tension.

3. Self-training questions

3.1. Types of work, their physical and hygienic characteristics. Physical work: its intensity. Mental work and its tension. Peculiarities of operator's work.

3.2. Physiological changes in the organism of the worker in the process of his physical and mental work and during operator's work. Fatigue and overload, their explanation and scientific substantiations of their development.

3.3. Modern principles and criteria of hygienic assessment of labour and its classifications according to its intensity and tension.

3.4. Methods of research of functional condition of organism at physical and mental work. Ergographic, physiologic and psycho-physiological tests. Work capacity and fatigue analysis by means of training simulators, tremor meters, dynamometers, chrono-reflex timers etc.

3.5. System of prophylactic measures for rational labour management process. Psycho-physiological occupational selection, diagnostics and mental overstrains.

4. Self-training assignments

4.1. Give the hygienic assessment of labour intensity and tension of electrical-type instrument female erector: sitting work posture, main operations (frame

mounting of details, soldering of catenaries) take 6.5 hours of 7 hour-long working day. Work is in relays: I and II shifts in turn every next week. Hygienic conditions of working zone: air temperature – 22-23°C, relative humidity – 58-65%, air movement – 0.2-0.25 m/sec. Suspended materials' concentration – 1.5 mg/m³, including 40 % of dust – on account of tin, lead (MAC of such dust is 4 mg/m³).

Noise level in the workshop is 85 decibel, speech intelligibility – within 2 meters, illuminance of workplace – combined, 225 lux (general illuminance of the shopfloor is 80 lux), light background, shiny silvered details, minimum size of those details is 0.2 mm, black ebonite instrument bodies.

Energy expenditure of female erector during a shift is 1 120 kcal. Heartbeat frequency (pulse) is 85 beats per minute. At ergometry muscle endurance at the beginning of the shift is 16 s and at the end – 19 s. Time of seeking numbers in the table: at the beginning of the shift is 62 kg/sec., at the end – 87 kg/sec.

Latent period of simple visual and motor reaction at the beginning of the shift is – 300 msec., at the end – 380 msec. and of complex reaction, thereafter, 420 msec. and 450 msec. Memorization of geometric figures: at the beginning of the shift is 3 of 6, at the end – 2 of 6.

4.2. General-duties woman in the bakery plant puts hot bread on wooden trays (18 loaves of mold bread on a tray). She carries trays to the distance of 2.5 – 3 meters and stacks them on load racks (on the wheels), bowing down to lower shelves and lifting trays up to upper ones (on the height of 1.8 m). There are 8 shelves on each load rack. Such work takes 5.5 hours of 7 hour-long working day. Content of the done work reaches the load of 120 trays. Weight of each tray is 20 kg. It is a 3 shift work. Change of shifts takes place every next week.

Microclimate of the workplace is: air temperature is 27-30°C all year round, relative humidity is 75-80%, air movement is 0.1-0.15 m/sec., radiant temperature – 32-33°C. Workshop illuminance is 60 lux, noise level is 72-78 dB.

Energy expenditure of female worker per shift is 2 500 kcal, average pulse frequency is 82-85 heartbeats per min., muscle endurance at the beginning of the shift is 20 kg/sec., at the end – 13 kg/sec.

Assess intensity and tension of the work of the woman, hygienic conditions of the workplace.

5. Structure and content of the lesson

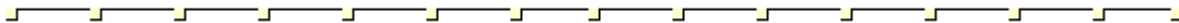
This is a laboratory study. After checking students' knowledge level and accomplishing of situational tasks by questioning students and giving them explanations, theoretical basics of physiology of labour, physiological changes in the worker's organism in work process, scientific bases of fatigue and overstrain development, prevention measures and techniques must be considered (35 min).

At the second part of the lesson students must take readings of work intensity and tension test system: ergometry, hand and stationary dynamometry, attention examination by seeking numbers in the tables, by seeking numbers with redirection of one's attention, by memory examination with the help of memorization of geometric figures.

These examinations are carried out before and after exercise stress (20 curtseys with 10 kg load). Results are registered in the protocol and conclusions are drawn. Methods of performance of listed examinations are given in the appendices.

6. Equipment required for the lesson

1. Weight (dumbbells, weight) of 10 or 20 kg.
2. Hand and stationary dynamometers.
3. Platonov's tables for seeking numbers: simple one and one for redirection of attention.
4. Anfimov's tables for letters' strike out.
5. Tables for memorization of geometric figures.
6. Tasks for students' self-control.



Topic 17

METHOD OF HYGIENIC ASSESSMENT OF NOISE AND VIBRATION (2 hours)

1. Learning objective

1.1. Strengthen and enlarge theoretical knowledge of students about noise and vibration as elements of industrial environment and their influence on organism and health.

1.2. Master techniques and means of measurement and hygienic assessment of noise and vibration parameters.

2. Basics

2.1. You should know:

2.1.1. Fundamentals of anatomy and physiology of auditory analyzer.

2.1.2. Physical fundamentals of acoustics and vibration.

2.1.3. Classification and fundamentals of noise and vibration source.

2.1.4. Biological effect of noise and vibration, and prevention of their negative influence on human organism.

2.2. You should have the following skills:

2.2.1. To use noise dosimeter and noise and vibration spectrum analyzer.

2.2.2. To detect threshold of audibility using of audiometer.

3. Self-training questions

3.1. Sound, noise, their definition.

3.2. Physical characteristics of noise, its measurement units.

3.3. Sound energy flux density, definition of volume.

3.4. Sound frequency band that human organ of hearing perceives.

3.5. Noise classification.

3.6. Noise influence on hearing organ. Specific and non-specific noise effect. Noise disease. Sound comfort notion, combating the noise.

3.7. Detection of vibration. Classification of vibration.

3.8. Physical characteristics of vibration. Vibration rate and vibration acceleration. Units of vibration measurement parameters, their spectral distribution. Concussions. Rectilinear and angular accelerations and overloads.

3.9. Biological effect of vibration, main symptoms of vibration disease.

3.10. Instruments for measurement of noise and vibration levels and spectral distribution, operation techniques.

3.11. Measures for reduction of noise and vibration harmful impact on human organism. Fundamentals and principals of noise and vibration hygienic control.

4. Self-training assignments

4.1. Estimate sound pressure in dB $P = 2 \cdot 10^2 \text{ N/m}^2$.

4.2. Sound pressure in the workshop № 1 is $P = 2 \cdot 10^2 \text{ N/m}^2$, in the workshop № 2

– $P = 2 \cdot 10^{-2} \text{ N/m}^2$. By how many dB is the sound pressure level in the workshop №1 higher than one in the workshop №2?

4.3. How many times indoor sound of the premise, with windows looking at the roadway (60 dB), is bigger than indoor sound of the same frequency but of the premise, with windows looking at the backyard (40 dB)?

4.4. Calculate the total amount of noise in the workshop, where 3 machines are operating and creating sound pressure levels of 90, 80 and 75 dB respectively.

4.5. Amount of noise at the distance of 1 m from operating centrifuge is 75 dB. What is the amount of noise at the distance of 10 m?

4.6. How many times sound intensity of one of operating machines will exceed sound intensity of another operating machine if their noise intensity difference is 20 dB?

4.7. Vibration parameters were measured in the generator hall of the power station. Measurement results are the following:

Average geometric frequency of octave band, Hz	2.0	4.0	8.0	16.0	31.0	63.0
Level of vibration speed, m/sec 10^{-2}	1.32	0.47	0.32	0.32	0.29	0.29
Level of vibration acceleration, m/sec ²	0.16	0.16	0.16	0.29	0.62	1.02

Make up a spectrogram. Assess the results. When accomplishing tasks, address to appendices to the topics.

5. Structure and content of the lesson

This is a laboratory lesson. It opens by questioning of students (check of the level of output knowledge). From the teacher the students receive terms of situational tasks, instructions for work with instruments, extracts from normative documents etc. In a separate room a laboratory for generation and measurement of noise and vibration parameters with the help of instruments "IIIYM-1-M3O" ("SHUM-1") and "BIIIB-003" ("NVD-003") is created. Besides, clinical audiometer (CA) is demonstrated. If possible the study can be carried out at an operating factory.

Individual study of students includes: learning of operation procedure with noise dosimeter, general rules of carrying out pure tone audiometry, situational tasks accomplishing, measurement of total amount of noise, sound pressure level in octave bands of noise and vibration frequency and noise stability of auditory analyzer. Tape record of noise of different origin, intensity and frequency serves as a noise source. Besides, students detect amount of noise during conversation, when windows are open and shut, (street), when technical equipment (centrifuge) operates in different modes. The students put measurement results into protocols, compare with hygienic standards, draw conclusions and give recommendations. The teacher controls resulting level of students' knowledge by checking protocols and asking students, putting marks.

6. Equipment required for the lesson

1. Inspection noise dosimeter SHUM-1-M.
2. Noise and vibration dosimeter NVD-003.

3. Maximum allowed level of noise at workplaces (extract from State Standard 12.1.003-83).

4. Maximum allowed levels of vibration (extract from State Standard 12.1.12-78).

5. Table: Assessment of resistance of hearing organs and degree of hearing loss.

6. Tasks for individual work of the students with noise, vibration and audiometry measurement instructions.



Topic 18

METHOD OF DETERMINATION OF AIR AND INDUSTRIAL ENVIRONMENT CHEMICAL CONTAMINATIONS (2 hours)

1. Learning objective

1.1. Acquire knowledge about the effect of occupational hazards on workers' health as well as regulations and procedure of investigation concerning occupational diseases and poisonings, proper paperwork.

1.2. Substantiate and take the indispensable therapeutic and prophylactic measures.

2. Basics

2.1. You should know:

2.1.1. Fundamentals of toxicology of chemical compounds – routes of penetration into organism, their transformation, mechanism of action, excretion.

2.1.2. Methods and techniques of intoxication prophylaxis, basic criteria of hygienic standardization of chemical compounds in the working zone air, in the other environments.

2.2. You should have the following skills:

2.2.1. To recognize and investigate cases of poisonings and diseases having chemical character, use appropriate normative and directive documentation.

2.2.2. To recommend and take prophylactic measures regarding occupational diseases and poisonings, assess their effectiveness.

2.2.3. To draw up the documents concerning investigation of the cases of occupational poisonings and diseases properly.

3. Self-training questions

3.1. Classification of industrial poisonous substances by their origin, chemical structure, degree of danger for organism, cumulative properties and tropism.

3.2. Main penetration routes of industrial poisonous substances into the organism, their complex, combined, synergistic, isolated action.

3.3. Most characteristic indices, which indicate the effect of industrial poisonous substances on the organism.

3.4. Types of occupational intoxication and peculiarities of clinical presentation when poisoning with the most widely spread poisonous substances.

3.5. Transformation of occupational poisonous substances in the organism (decomposition, transformation, intermediate products and by-products, their effect on intoxication clinical course).

3.6. Material and functional cumulation of occupational poisonous substances, its significance in the development of occupational poisonings, tropism of poisonous substances.

3.7. Acute and chronic occupational diseases and poisonings, their peculiarities.

3.8. Influence of occupational environmental conditions on toxic action of industrial poisonous substances. Working zone risk factors, which increase (potentiate) the effect of occupational poisonous substance. “Instruction on how to draw up the hygienic and sanitary characteristic of the conditions of work” (1985), as a ground to substantiate the diagnosis of “occupational” disease or poisoning.

3.9. Clinical peculiarities of poisonings with the most widely spread occupational poisonous substances – lead, mercury, benzol, manganese, carbon oxide, hydrogen sulphide and others.

3.10. Main principles and criteria of hygienic standardization of occupational poisonous substances in the working zone air as a ground for the prophylaxis of poisonings. Other methods and techniques of prophylaxis of poisonings.

3.11. Description of the documents, which are to be used in the course of investigation of the cases of occupational poisonings or diseases: - “Emergency report on the acute occupational disease (poisoning)”. (H-3 registration form); “Registration card of occupational disease (poisoning)” (II-5 form); “Registration book of occupational diseases (poisonings)” (II-6 form); “Accident certificate” (H-1 form).

4. Self-training assignments

4.1. When a regularly scheduled medical examination of the workers, who pour less-common non-ferrous metal (zinc) into small molds, was carried out in the works, there were the following changes in peripheral blood detected: blurred reticulosis, basophilic stippling of erythrocytes, decrease of hemoglobin content. When carrying out the examination there was observed the peculiar hardly noticeable sallow pale colour of cutaneous coverings, inconspicuous limbus of chalky-scaly color along the margin of gums, qualitative test for presence of heavy metals in blood was positive; in urine –negative, though there was detected increased content of porphyrin in it.

When carrying out investigation of workers’s conditions of work it was ascertained the following: pouring of metal into molds is done manually, this work is qualified as hard work, pouring area is equipped with aeration system using thermal head, places of pouring of metal are not provided for fume hoods. Temperature of air within workplace zone was 23°C during cold season, during warm season – up to 26°C. Concentration of aerosols of poured metal oxides in workplace zone was within 0.08-0.12 mg/m³ (MAC – 0.01 mg/m³). Workers did not use personal protective equipment.

Tasks:

1. Specify possible causes, which set conditions for origination of this occupational poisoning, substantiate the “occupational poisoning” diagnosis.

2. List main measures the physician must take in case of this occupational poisoning.

3. Describe the clinical picture and prophylaxis of zinc oxide poisonings in detail.

4.2. On September 21 of current year, 41-year old gasoline tank truck driver went to the polyclinic of petroleum refining plant to consult a physician because of headache, vertigo, nausea, asthenia, heartbeats, general tremor, sense of squeezing at heart area, sore throat, cutting pain in eyes.

Occupational assessment: he considers that he became ill since September 21 of current year, when in 3 hours after truck tank washing he felt hysteric reaction caused by trivial remark, tears, vertigo, nausea, asthenia, heartbeats, and then sleepiness, flaccidity, sharp cough, cutting pain in eyes, though he was in good health before.

Objective evidence: mucous membranes and cutaneous coverings are without changes. Blood pressure (BP) – 80/60 Hg mm, pulse is 54 heart beats per minute, respiratory rate is 16 per minute, rough breath sounds in lungs, body temperature is 35.6°C. Heart sounds are muted. Stool is usual.

Tasks:

1. Set a provisional diagnosis.
2. Specify possible causes that set conditions for origination of this poisoning. Is there any substantiation to recognize this poisoning as occupational poisoning?
3. Specify main prophylaxis methods for gasoline vapour poisoning.
4. Draw up an emergency report on the acute occupational poisoning and other documents concerning its investigation.

4.3 On March 5 of current year, seven workers from the sulfur-bearing oil processing (hydrogen sulfide extraction) workshop went to the medical and sanitary unit of the petroleum refining plant to consult a physician because of burning pain and cutting pain in eyes, cough, headache, nausea, emesis, problems with coordination of movements. Medical treatment was not provided.

On March 4 of current year the patients were working during the whole day in the workshop, where there was no exhaust ventilation due to routine maintenance of sanitary appliances.

Objective evidence: mucous membranes are irritated, cutaneous coverings are slightly hyperemic, and pulse is 60 heart beats per minute. Respiratory rate is 22 per minute, arterial pressure is 80/60 Hg mm. Body temperature is 37.5°C. Heart limits are within normal. Distant dry stertors are heard in lungs, rough breath sounds, liquid stool.

Tasks:

1. Specify possible cause of poisoning. Is there any substantiation to recognize it as occupational poisoning?
2. Which supplementary anamnestic data should one have to determine ethiology of occupational disease?
3. List main measures the physician must take in case of this occupational poisoning.
4. Draw up an emergency report on the acute poisoning, the investigation certificate.

5. Structure of the lesson

This is a practical training. Homework having been checked, the students and their teacher discuss theoretical questions on this topic, but for all that the teacher asks questions to the students and provides his explanations according to the list of questions for self-training. The students work independently after they have been given individual tasks (situational problem) to investigate case of occupational poisoning or occupational disease. In the course of this work the students must study the case of occupational disease or occupational poisoning, diagnose patients, and specify the cause of the disease, make proposals concerning carrying out of regular medical inspection of this industrial enterprise, substantiate optimal measures to improve conditions of work. They should arrange the results of their work in writing in their books for protocols in the form of comprehensive certificate including proposals concerning improvement of conditions of work for the workers in this industrial enterprise and execute all necessary documents according to the forms attached as appendixes.

6. Equipment required for the lesson

1. Forms of documents for registration of occupational poisonings and occupational diseases: “Emergency report on the acute occupational disease (poisoning)”; “Registration card of occupational disease (poisoning)”, “Registration book of occupational diseases (poisonings)”; “Accident Certificate”.
2. List of occupational diseases (MPH, MFA and ML. Order № 23 (36/9)).
3. Situational tasks regarding investigation of cases of occupational diseases or occupational poisonings in industrial enterprises.



CONCLUDING LESSON ON SECTION «HYGIENE OF LABOUR»

1. Learning objective

Strengthen, complete and systematize knowledge and practical skills on the “Occupational hygiene” section

2. Basics

1.1. You should know:

1.1.1. Fundamentals of Ukrainian legislation in the sphere of hygiene and labour protection.

1.1.2. Organization forms, methods and means for provision of favourable working conditions at industrial, construction and transport enterprises.

1.1.3. Structure, forms and methods of the work of medical units of industrial enterprises – medical and sanitary centers (MSC), medical posts and factory’s sectorial physicians.

2.2. You should have the following skills:

2.2.1. To determine danger and hazard of industrial environment, assess their influence on organisms of the workers and their health.

2.2.2. To investigate cases of occupational diseases and poisonings, execute essential accompanying forms.

2.2.3. To organize preventive measures in industry, record-keeping and reporting documentation.

2.2.4. To carry out preliminary and regular medical examinations of the workers for occupational selection and timely detection of health impairment of the workers.

3. Self-training questions

3.1. Labour, its definition from physical, physiological, philosophical and social points of view. Labour as a commodity.

3.2. Types of labour, their physiological and hygienic characteristics. Physical and mental work.

3.3. Fundamentals of labour physiology. Physiological changes in organism of a worker during work. Fatigue and overfatigue, scientific substantiations of their development.

3.4. Up-to-date principles and criteria of work assessment according to levels of its intensity, complexity and tension.

3.5. Classification of labour according to its intensity, complexity and tension.

3.6. Technique of assessment of organism’s functional condition at physical and mental works. Ergographic, physiological and psycho-physiological tests. Working capacity and fatigue assessment using trainers.

3.7. Objects of work. Variety of work processes. Characteristics of working zone.

3.8. Classification and characteristic of occupational hazards according to State Standard 12.0003 – 74 “Dangerous and hazardous factors”.

3.9. Characteristic of physical factors of industrial environment.

3.10. Classification of chemical factors of industrial environment according to their origin, toxic level, hazard and tropic effect.

3.11. Isolated, combined, complex and joint action of industrial hazards of chemical and physical origin.

3.12. Biological factors of industrial environment. Industries and occupations that are effected by biological agents as occupational hazards.

3.13. Psycho-physiological hazards of industrial environment. Occupational hazards, involving overload of certain organs and systems.

3.14. Peculiarities of organism’s response to physical, chemical, biological and psycho-physiological effects of occupational hazards. Occupational diseases and poisonings, occupational traumatism.

3.15. Main industrial toxic substances and routes of their penetration to organism. Types of their action, transformation in organism, routes of industrial toxins’ excretion from organism.

3.16. Conditions that determine industrial toxins’ poisonous effect, their physical and functional cumulation in organism.

3.17. Peculiarities of clinical findings of poisoning by the most common toxins: lead, mercury, manganese, benzol, etc.

3.18. Influence of industrial environment on industrial toxins’ poisoning effect. Causes of occurrence of acute and chronic occupational poisonings.

3.19. Indices that define industrial toxins’ effect on organism.

3.20. Health disturbances and diseases caused by the effect of harmful microclimate of industrial environment – hot and cold. Peculiarities of work in hot shops and outdoors in winter.

3.21. Types of occupational pathology, associated with the effect of electromagnetic radiation of different frequencies: RF, apparent (lasers), infra-red, ultra-violet, high, ultrahigh, ionizing.

3.22. Occupational pathology caused by the effect of particulate pollutants of different origin and dispersion ability on organism.

3.23. Health disturbances and diseases associated with increased and decreased barometric pressure effect. Caisson disease, altitude sickness.

3.24. Noise as physical and hygienic factor. Sources of natural, outdoor, domestic and industrial noise.

3.25. Noise classification by frequency, intensity, time characteristics.

3.26. Noise measurement units and fundamentals of its hygienic regulation.

3.27. Noise effect on hearing organ: sound comfort, noise adaptation, auditory lassitude overfatigue, noise disease. Sound frequency band, which is perceived by hearing organ of a man and his sensitivity and susceptibility to these frequencies.

3.28. Means of noise control in the residential areas, premises of different function, manufacturing facilities.

3.29. Means and techniques of measurement of noise levels and frequencies (noise dosimeter and noise spectrum analyzer) and sensitivity of auditory analyzer (audiometers).

3.30. Infra-sound, ultra-sound, their sources, effect on organism, medical application, methods of protection.

3.31. Vibration as physical and hygienic factor. Vibration sources in transport and industry. Vibration classification according to frequency, intensity, time characteristics, vibration accelerations.

3.32. Vibration measurement units and fundamentals of their hygienic regulation.

3.33. Vibration effect on organism. General and local vibration disease, stages of its development, occupational characteristic.

3.34. Instruments for measurement of vibration speed, vibration acceleration, vibration frequency, principles of their operation.

3.35. Technical and hygienic measures for reduction of negative vibration effect on organism.

3.36. Hygiene and labour protection as basis for occupational disease and poisoning prevention.

3.37. Main regulations of legislative documents concerning labour protection (Constitution of Ukraine, Labour Code, Code of Sanitary Rules and Norms, State Standards, legislation in force).

3.38. Fundamentals and principles of hygienic regulation of working conditions at different productions. Maximum allowable levels (MAL), concentrations (MAC), doses (MAD), oriental safe influence levels (OSIL), specification (Spec.), etc.

3.39. Means and techniques for prevention of impact of dangerous and harmful industrial factors on workers' organism (automation, sealing, remote control, insulation, ventilation, personal protective equipment).

3.40. System of preventive measures concerning rational organization of work and leisure regimen at the enterprise. Treatment and preventive nutrition at hazardous industries. Industrial Engineering (IE).

3.41. Forms of organization of medical care of workers in industry, construction, transport, agriculture: medical and sanitary stations, medical posts, regional medical service.

3.42. Regulations on medical and sanitary centers (MSC), medical posts, engineering-medical teams, their structure, staff, duties.

3.43. Enterprise physician, his duties.

3.44. Tasks of medical and sanitary stations and medical posts in reduction of temporary disability and prevention of occupational diseases and poisonings.

3.45. General contractual provisions with enterprise administration regarding introduction of safety measures, industrial sanitation and package plan of realization of sanitary and medical measures.

3.46. Significance of preliminary and regular medical examinations of the workers in working conditions, improvement and elimination of reasons that cause

occupational diseases and poisonings. Orders of Ministries of Public Health of USSR (№ 555 from 29.09.89) and Ukraine (№ 45 from 31.03.94).

3.47. Psycho-physiological selection and psycho-prophylaxis as preventive measures of morbidity on the emotionally stressful workplaces, especially at operator's work.

3.48. Basic ways of improvement of quality and organization of temporary disability examination in institutions of patient care and prevention.

3.49. Organizational work forms and tasks of medical and social commissions of experts (MSCE), medico and control commissions (MCC), medical and labour commissions of experts (MLCE).

3.50. Organization of groups of sanitary activists, sanitary education and safety measures as prevention of occupational diseases and poisonings.

3.51. Registration and reporting documentation of MSC, medical posts at enterprises.

3.52. Role of sanitary epidemiological stations (SES) in organization of sanitation measures at enterprises.

3.53. Scientific and research institutions of labour medicine, labour hygiene and occupational diseases of Ukraine, their role in development of sanitary legislation in the sphere of labour hygiene and sanitations in different production fields.

4. Self-training tasks

4.1. During the preparation to the concluding session it is reasonable to update knowledge of section "Hygiene of labour" according to the list of questions of article 3., to repeat technique of execution of practical skills that were received at the practical studies of the corresponding topics.

4.2. Approximate variants of tests, situational tasks, instruments, their manuals and other materials for self-training one can get from a teacher on duty or a laboratory assistant.

5. Structure and content of the lesson

Concluding lesson lasts 2 academic hours and is held at the training laboratories of the department that are equipped with instruments and appropriate reference materials.

Every student receives 3-4 questions in theory and one situational task or tasks for work with instruments, which department prepares. Students answer questions and fulfill tasks in written form during 45-50 min., and at the second part of the lesson, a teacher discusses answers with individual students, selectively.

When checking test results and putting down marks in the register of students' attendance and progress in studies, the teacher takes into account completeness and quality of each answer, their day-to-day progress at practical studies, completeness and quality of practical lesson protocols.

Results of concluding lesson are discussed at the training technique committee of the department.

6. Literature

6.1. Principal:

6.1.1. Hygiene and human ecology. Manual for the students of higher medical institutions/ Editor prof. V.Bardov. – Kiev, 2008. – 720 p.

6.1.2. General hygiene and environmental health. Manual for the students of high medical schools/ Editor prof. M. Nadvorny – Odessa, 2005. – 242 p.

6.2. Additional:

6.2.1. General hygiene and medical ecology. Textbook for student's medical faculty/ Editor prof. S.Shibanov. – Simferopol, 2004. – 540 p.

7. Equipment required for the lesson

1. Instruments for examination of students' knowledge and skills in accordance to the topics of the sections.

2. Tasks and questions for control of students' knowledge, efficiency and skills.

3. Reference material for solution of situational tasks in accordance to the topics of some studies of the section.

Examples of tests

Variant 1

1.1. Labour, its definition from physical, physiological, philosophical and social points of view. Types of legislation in the sphere of occupational hygiene.

1.2. Classification of chemical factors of industrial environment according to their nature, toxic level, hazard and tropism. Basic industrial toxic substances and ways of their penetration into organism, transformation, ways of excretion from organism.

1.3. Regulations about medical and sanitary centers (MSC), medical posts, engineering-medical teams, their structure, stuff, duties.

1.4. Determine the general amount of noise in woodworking shop, where 4 circular saws are working. Each of them creates noise of 80 dBA.

1.5. Measure heat radiation level (from reflector, electric range) using actinometer and assess the results according to hygienic regulations for hot shops.

Variant 2

2.1. Noise, noise disease, their definition. Noise classification by frequency, intensity, time characteristics. Foundations of noise hygienic regulation.

2.2. Work intensity and tension, their classification, methods of their measuring and assessment.

2.3. Psycho-physiological hazards and hazards involving overload of separate organs and systems, their hygienic characteristic, measures and methods of prevention.

2.4. Standards of indoor microclimate parameters for working zone in summer and winter seasons.

2.5. Measure the illuminance of the workplace using luxmeter; draw an appropriate conclusion about its sufficiency for laboratory.

Content

№	Topic	Type of lessons	Hours	Page
1.	Introduction to the course. A place and value of hygiene in the system of medical sciences and a doctor's activity. Methods of hygienic research.	practical	2	
2.	Method of determination and hygienic assessment of temperature, humidity, air movement direction, their influence on the heat exchange. Hygienic assessment of complex effects of the microclimate on the human heat exchange.	laboratory	2	
3.	Hygienic assessment of effulgent energy. Methods of determination of intensity and preventive dose of the ultraviolet radiation and its usage for the disease prevention and air sanitation.	laboratory	2	
4.	Methods of determination of CO ₂ concentration as the indicator of the anthropogenic air pollution and ventilation. Notion of an air cube, necessary and actual volume and different types of ventilation, its scientific ground.	laboratory	2	
5.	Basics of the preventive sanitary inspection. Method of building project examination. Methods of determination and hygienic assessment of natural lighting and artificial illumination in different premises.	laboratory	2	
6.	Content module # 1.	submodule	2	
7.	Method of hygienic assessment of soil according to the sanitary inspection of the land parcel, results of laboratory analysis of samples and cleaning of the populated places.	laboratory	2	
8.	Technique of the sanitary inspection of water supply sources for bacteriological and sanitary-and-chemical analysis. Method of assessment of drinking water according to results of laboratory analysis of samples.	laboratory	2	
9.	Methods and facilities of cleaning, disinfection of water at the centralized and decentralizing water supply sources. Content module # 2.	submodule	2	
10.	Method of calculation of human energy spending and its requirements in nutrients. Assessment of nutrition adequacy using the menu-schedule.	practical	2	
11.	Method of study and assessment of the human nutritional status and medical control of vitamin sufficiency in the organism.	laboratory	2	
12.	Method of expert assessment of food products and ready meals according to their laboratory analyses.	laboratory	2	
13.	Theoretical aspects and method of prophylaxis of alimentary diseases. Hygienic basics of dietary treatment and medical prophylactic nourishment.	practical	2	
14.	Methods of investigation of the food poisoning cases.	practical	2	
15.	Content module # 3.	submodule	2	
16.	Physiology of labor. Method of hygienic and sanitary assessment of labor intensity and tension for the overwork prevention and increase of working capacity.	practical	2	
17.	Method of hygienic assessment of noise and vibration.	laboratory	2	
18.	Method of determination of air and industrial environment chemical contaminations. Content module # 4	submodule	2	
19.	Final module control: Control of practical preparation	module	2	
20.	Final module control: Test control of theoretical preparation	module	2	