

## ***ECOLOGICAL MEDICINE***

Guidelines for the 2<sup>nd</sup> year students (Faculty of International Students)

### **LESSON № 1: ENVIRONMENTAL MEDICINE. ENVIRONMENTAL FACTORS AND HEALTH OF THE POPULATION.**

**THE AIM:** to study the basics of environmental medicine, its interaction and communication with other biological and medical sciences; to know the concept of environmental medicine; the factors determining the ecological well-being of the urban environment; to muster methods for evaluating the impact of environmental factors on health.

**DURATION:** 4.0 hours (1hour self-education).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodological materials.

#### **Required theoretical knowledge**

1. Environmental medicine concept, goals, objectives, environmental medicine.
2. Environmental medicine: history of development.
3. Environmental diseases: definition, concept, examples.
4. Methods for evaluating the impact of environmental factors on health.
5. Effect of chronic influence of subthreshold values of environmental factors on the formation of ecologically dependent diseases among the population.
6. Ecologically dependent morbidity.
7. The impact of chronic exposure to subthreshold values of environmental factors on the formation of environmentally dependent morbidity in the population.
8. Features of the approach to the diagnosis, treatment and prevention of diseases from the perspective of environmental medicine.
9. The importance of environmental medicine in the formation of medical personnel for the needs of preventive health care.
10. Environmental factors: definition, classification and general characteristics.
11. Characteristics of abiotic and biotic environmental factors.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. Environmental factors: definition, classification and general characteristics, mechanism of action, adaptation.
2. Characteristics of abiotic environmental factors.
3. Characteristics of biotic environmental factors.
4. Specific mechanisms of protection against the adverse effects of environmental factors.
5. Non-specific mechanisms of protection against the adverse effects of environmental factors.

#### **Laboratory (individual) work of students**

1. To muster methods of assessing the impact of environmental factors on health.
2. To create preventive recommendations to improve the visual quality of the environment.
3. Solution situational tasks.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Высш. Шк., 2007. – 368 с.

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### **LESSON № 2 «PATHOGENETIC MECHANISMS OF ACTION OF PHYSICAL FACTORS ON THE HUMAN. ULTRAVIOLET RADIATION. INFLUENCE OF GEOMAGNETIC FACTORS. METEOSENSITIVITY».**

**THE AIM:** to study medical and biological characteristics of the impact of ultraviolet radiation (UVR) on the human body; the basics of chronobiology and chronomedicine; the pathogenesis, clinical symptoms and prevention of meteorological reactions;  
to explore the basic biological effects of UVR action; ways to assess the impact of ecological factors on health, physical and mental abilities; methods for assessing meteorological parameters;  
to master risk assessment to human health caused by environmental conditions; the methods of individual health diagnosis; the method for assessment the risk of seasonal affective disorder.  
to perform the task of diagnosing an individual's health.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials, tasks.

#### **Required theoretical knowledge**

1. Ultraviolet radiation (UVR): concept, ranges of spectrum.
2. The role of UVR radiation in formation responses to the actions of radiation.
3. The mechanisms of natural protection from the damaging effect of UVR.
4. Deterministic and stochastic effects of UVR on human organism.
5. Modification of the body's sensitivity to UVR.
6. Meteosensitivity: definition, classification, taking into account the severity of the clinical manifestations and types of meteorological reactions.
7. Influence of unfavorable weather on patients with diseases of respiratory, circulatory and nervous system. Prevention of the meteorological reactions and diseases.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. Chronobiology and chronomedicine. Influence of the visible region of the solar spectrum and light on the person.
2. Biological rhythms: concept, classification.
3. Circadian rhythms, the concept of regulation.
4. Reasons of development, clinical manifestations, prevention and treatment of seasonal affective disorder.
5. Individual chronotype: concept, classification.

#### **Laboratory (individual) work of students**

1. To learn the methodology of assessment of the biological effect of UVR radiation: the definition of the type of skin sensitivity and master the evaluation of the risk of skin cancer from exposure to UVR.
2. To assess personal risk to have cancer of skin.
3. Determination an individual chronotype by the Ostberg's test.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Высш. Шк., 2007. – 368 с.

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### **LESSON № 3: « ECOTOXICOLOGY. PATHOGENETIC MECHANISMS ACTION OF CHEMICAL FACTORS ON HUMAN ORGANISM».**

**THE AIM:** **to study** the role of chemical environmental factors in occurrence environmentally dependent diseases; genomic instability; the mechanisms detoxification of xenobiotics in the human organism;

**to explore** the pathogenetic mechanisms of action of chemical environmental factors on the human organism;

**to learn** the main features of the impact of chemical environmental factors on the human organism; the diagnosis of tumors and somatic diseases, the activities for prevention of adverse effects of xenobiotics with food on the human organism.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Ecotoxicology: definition, concept and main directions.
2. Xenobiotics: concept, classification, general characteristic. Properties of xenobiotics determining their toxicity. Mechanisms of toxic action.
3. Toxicokinetics: absorption of xenobiotics, their distribution in the body, metabolism and excretion.
4. General characteristic detoxification of xenobiotics in the human organism.
5. Basic mechanisms detoxification of xenobiotics in the human organism.
6. Prevention of adverse effects of xenobiotics with the food on the human body.
7. Multiple chemical sensitivity: concept, reasons of the development, clinical symptoms, medical diagnostics.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. The role of genetic factors in the occurrence of ecologically dependent pathology.
2. The frequency and types of mutations, DNA damage.
3. Significance of genomic instability in causing diseases.
4. Somatic mutations and tumors value oncogenes and tumor repressor genes.

#### **Laboratory (individual) work of students**

1. To muster the methodology of risk assessment for non-carcinogenic substances.
2. To master the methodology of individual risk assessment.
3. Calculation of carcinogenic risk for chemical pollutants.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Высш. Шк., 2007. – 368 с.

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### **LESSON № 4: «ECOLOGICAL AND MEDICAL CONSEQUENCES OF ATMOSPHERE POLLUTION».**

**THE AIM:** to study the main sources of air pollution;

to explore the environmental issues associated with air pollution;

to learn the Vienna Convention and the Montreal Protocol on substances that deplete the ozone layer.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodological materials.

#### **Required theoretical knowledge**

1. Atmosphere: structure, chemical composition and role.
2. Main sources of pollution and their characteristics. Characteristics of the main air pollutants of the city (sulfur dioxide, nitrogen oxide, carbon monoxide) and related diseases.
3. Ozone layer: concept, function of the ozone layer. Reasons for the destruction of the ozone layer, negative consequences for humanity.
4. Smog: concept, types, conditions of development, effects of exposure on the human body.
5. Acid rain: concept, causes of formation, negative consequences for humanity.
6. Measures for the protection of the atmosphere from pollution sources.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. Greenhouse effect: concept, causes of formation, negative consequences for humanity
2. Measures for the protection.
3. Weather: concept, general characteristics, features of impact on the human body.
4. Climate: the concept, general characteristic, features of impact on the human body.
5. Acclimatization: concept, phases and their characteristics.

#### **Laboratory (individual) work of students**

1. To study the Vienna Convention on substances that deplete the ozone layer.
2. To study and the Montreal Protocol on substances that deplete the ozone layer.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Высш. Шк., 2007. – 368 с.

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### **LESSON № 5: « ECOLOGICAL AND MEDICAL CONSEQUENCES OF HYDROSPHERE POLLUTION».**

**THE AIM:** to study the main sources of hydrosphere pollution;  
to explore the environmental issues associated with hydrosphere pollution;  
to learn the criteria quality of drinking water: organoleptic properties, physical, chemical and biological composition.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Hydrosphere: structure, meaning.
2. Main sources of pollution of the hydrosphere and their characteristics.
3. Role of water in the spreading of diseases (endemic diseases, epidemic diseases and chronic poisonings).
4. Eutrophication of the water bodies: the concept, cause of the consequences.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. To study the criteria quality of drinking water: organoleptic properties, physical, chemical and biological composition.

#### **Laboratory (individual) work of students**

1. To prepare a booklet for the prevention of endemic diseases among the population. This booklet should include the following information: the name of endemic disease; the causes of endemic disease; the frequency of occurrence among the population; the main clinical symptoms of this disease; the ways of prevention of this disease.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Вышш. Шк., 2007. – 368 с.

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### **LESSON № 6: « ECOLOGICAL AND MEDICAL CONSEQUENCES OF LITHOSPHERE POLLUTION. ENDEMIC MORBIDITY OF THE POPULATION IN DIFFERENT REGIONS OF THE WORLD».**

**THE AIM:** to study the main sources of the lithosphere pollution; with the endemic diseases, which occurs in different regions of the world;  
to master the medical aspects of the prevention of endemic diseases;  
to explore the environmental issues associated with soil contamination;  
to learn the measures for the protection of the lithosphere from sources of pollution.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Lithosphere: structure and its value.
2. Role of soil in the transmission of diseases (endemic, epidemic and chronic poisonings).
3. Main sources of pollution of the lithosphere and their characteristics.
4. Measures for the protection of the lithosphere from pollution sources.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. Endemic pathology: definition, concept.
2. Biogeochemical provinces: concept, role in the occurrence of environmentally depended diseases.
3. Endemic goiter: concept, causes of symptoms, nonspecific and specific prevention.
4. Diseases caused by iron deficiency and iron excess: the causes of the disease, symptoms and prevention.

#### **Laboratory (individual) work of students**

1. To prepare a booklet for the prevention of endemic diseases among the population. This booklet should include the following information: the name of endemic disease; the causes of endemic disease; the frequency of occurrence among the population; the main clinical symptoms of this disease; the ways of prevention of this disease.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Выш. Шк., 2007. – 368 с.

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### **LESSON № 7: «ROLE OF NITRATES, NITRITES AND NITRO COMPOUNDS IN THE DEVELOPMENT OF PATHOLOGY AMONG THE POPULATION»**

**THE AIM:** to learn the role of nitrates, nitrites and nitro compounds in the development of pathology among the population;  
to study standards which regulate content of nitrites and nitrates in food;  
to get acquainted with the ways of prevention of negative influence of nitrates, nitrites and nitro compounds on the human organism.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Nitrates: chemical characteristics, reasons of receipt in the human organism, the main clinical symptoms of acute and chronic poisoning and its prevention.
2. Nitrites: chemical characteristics, reasons of receipt in the human organism, the main clinical symptoms of acute and chronic poisoning and its prevention.
3. Nitro compounds: chemical characteristics, reasons of receipt in the human organism, the main clinical symptoms of acute and chronic poisoning and its prevention.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. The main clinical symptoms of acute and chronic poisoning by nitrates and its prevention.
2. The main clinical symptoms of acute and chronic poisoning by nitrites and its prevention.
3. The main clinical symptoms of acute and chronic poisoning by nitro compounds and its prevention.

#### **Laboratory (individual) work of students**

1. To develop measures for the prevention of poisoning by nitrates, nitrites and nitro compounds.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Вышш. Шк., 2007. – 368 с.

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### **LESSON № 8 «ECOLOGICAL AND MEDICAL CHARACTERISTICS OF INTERNAL ENVIRONMENT OF PREMISES ON THE HUMAN ORGANISM. MEDICAL ASPECTS OF INFLUENCE OF NON-IONIZING ELECTROMAGNETIC RADIATION »**

**THE AIM:** **to get acquainted** with influence of factors of indoor environment on the human body;  
**to study** pathogenetic mechanisms of action of factors of indoor environment on the human body, which have physical, chemical and biological nature;  
**to master** the methods which aimed at preventing the negative influence of factors of indoor environment on human body;  
**to familiarize** with the characteristics of non-ionizing electromagnetic radiation;  
**to explore** the usage non-ionizing electromagnetic radiation in medicine;  
**to learn** the technique of quantitative determination of the parameters of the electric and magnetic fields.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Ecological characteristic of residential and public buildings.
2. Physical factors of indoor environment, affecting human health.
3. Chemical factors of indoor environment, affecting human health.
4. Biological factors indoor environment, affecting human health.
5. International classification of electromagnetic waves according to their frequency. Characteristic of non-ionizing electromagnetic radiation.
6. Electrosensitivity: definition, prevalence among the population, the main clinical symptoms.
7. Electrosmog: concept, sources, reducing the adverse effects of its influence on the population.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. «Sick building syndrome»: concept, reasons, main clinical symptoms.
2. Mobile communication: principles, particularly the influence of pulsed radiation on the human body.
3. The usage of non-ionizing electromagnetic radiation in medicine.

#### **Laboratory (individual) work of students**

1. To familiarize with the methodology of work and to make measurements of parameters of electric and magnetic fields in the student room using the device for measurement of electric and magnetic fields BE-METER-AT-002.

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Высш. Шк., 2007. – 368 с.



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### **LESSON № 9 «ENVIRONMENTAL MONITORING AND HEALTH OF THE POPULATION. LEGAL FRAMEWORK OF ENVIRONMENTAL PROTECTION »**

**THE AIM:** to **familiarize** with the concept of «environmental monitoring»; to learn the system of global and local monitoring; with the laws for the protection of nature and natural resources; with «Red book of the Republic of Belarus»; to **study** the fundamentals of environmental law.

**DURATION:** 4.0 hours. (1.0 hour self studying).

**THE PLACE:** student's room according to the timetable.

**EQUIPMENT:** methodical materials.

#### **Required theoretical knowledge**

1. Monitoring: concept, types.
2. Systems of global and local monitoring.
3. The national system of environmental monitoring.
4. Socio-hygienic monitoring, concept, goals, objectives, stages.

#### **SELF - EDUCATION WORK OF STUDENTS**

1. Basic principles of environmental law.
2. Laws for the protection of nature and natural resources.
3. Responsibility for the violation of norms of environmental law.

#### **Laboratory (individual) work of students**

1. Read information about the risk factors which dominate in modern society.
2. To familiarize with «Red book of the Republic of Belarus».

#### **Literature**

##### **Basic:**

1. Lecture materials.
2. Methodological materials of department.

##### **Additional:**

1. Стожаров, А.Н. Медицинская экология: учеб. пособие / А.Н. Стожаров. – Минск: Вышш. Шк., 2007. – 368 с.