

MINISTRY OF SCIENCE AND HIGHER EDUCATION
RUSSIAN FEDERATION
Federal State Autonomous Educational Institution of Higher Education
NORTH-CAUCASUS FEDERAL UNIVERSITY

**EDUCATIONAL AND METHODOLOGICAL COMPLEX FOR PRACTICAL
SKILLS TRAINING**

Human Ecology

(Name of the practical training)

- Specialty: 31.05.01 General Medicine
- Mode of training: Full-time
- Year of commencement of studies: 2026
- Delivered in Semester 4, 5

Developed by:

Head of department
of ecology and biogeography

position

Kharin K.V.

full name

INTRODUCTION

1. The purpose and objectives of mastering the discipline

1. Aims of the Practical Skills Training

- Aim of mastering the discipline to equip the future specialist with theoretical knowledge regarding the environmental aspects of the human-environment relationship-including the fundamentals of adaptation theory, environmental epidemiology, and the social aspects of human ecology - as well as practical skills for assessing public health risks associated with environmental conditions.
- Objectives of mastering the discipline:
 - study of anthropo-ecological axioms;
 - study of the fundamentals of the theory of adaptive types and the patterns of geographical variation in anthropological traits;
 - mastery of the principles and methods of environmental epidemiology and the study of public health risk factors;
 - study of the social aspects of human ecology and concepts such as "lifestyle," "quality of life," "vital potential," and the "Human Development Index" from global and regional perspectives;
 - acquisition of knowledge regarding environmental valeology and the fundamentals of self-preservation behavior;
 - study of regional issues in human ecology;
 - study of methods for assessing environmental risks to human health.

STRUCTURE AND CONTENT OF PRACTICAL CLASSES

Practical classes 1

Introduction to Human Ecology.

The aim of the work to provide students with an understanding of human ecology as a complex, interdisciplinary science and of the discipline's primary objectives; and to deepen their knowledge regarding the history of the accumulation of insights in human ecology, the discipline's interrelationships with other sciences, and its position within the system of ecological knowledge.

Key terms: ecology, human, passionarity, alarmism, intellect, ecumene, pan-ecumenical species, polymorphism, human population, mentality, human ecology, anthropological axioms.

Quiz Questions

1. What does "human ecology" study?
2. Which scientists contributed to the development of human ecology as a science?
3. Which disciplines is human ecology closely related to?
4. Which year can be considered the birth year of human ecology as a science?
5. The research of which prominent European scientists influenced the establishment of human ecology as a science?
6. With the names of which scientists is the actual emergence and development of human ecology as a science associated?
7. How is human ecology linked to the humanities, social sciences, and natural sciences?
8. What is the significance of establishing human ecology as a distinct, independent field of scientific knowledge?
9. What accounts for the diversity of research directions within human ecology?
10. Define ecology as a science. List modern definitions of the term "ecology."
11. What are the goals and objectives of human ecology?
12. What is the structure of human ecology?
15. How are human ecology and medicine related?
16. What gave rise to the need to study human ecology?
17. Describe the relationship between human ecology and other sciences.
18. List and describe the main methods used in conducting research in human ecology.

List of key literature:

1. Dyball R., Newell B. Understanding Human Ecology: A Systems Approach to Sustainability. 2nd ed. London: Routledge, 2023. 240 p
2. Marten G. G. Human Ecology: Basic Concepts for Sustainable Development. London: Earthscan Publications, 2001. 256 p.
3. Kormondy E. J., Brown D. E. Fundamentals of Human Ecology. Upper Saddle River: Prentice Hall, 1998. 503 p.

List of additional literature:

1. Miller, G. T., & Spoolman, S. (2019). *Environmental science* (16th ed.). Cengage Learning.
2. Hawley, A. H. (1950). Human ecology: A theory of community structure. Ronald Press Co.

Practical classes 2

Environmental factors affecting humans.

The aim of the work To study environmental factors, their classification, and the patterns of their impact on the human body.

Key terms: abiotic factor, anthropogenic factor, biotic factor, animals, optimum zone, zone of inhibition, limiting factor, law of the minimum, optimum zone, zone of pessimum, critical points, ecological valence, eurybiont, stenobiont, ecological spectrum of a species, zone of preference, tolerance, constellation of factors, effective temperature, law of the limiting factor, law of factor interaction and compensation, acclimation.

Quiz Questions

1. What are ecological factors? Into what groups are they classified? Provide as many examples as possible of factors from each group.
2. Which factors are classified as resources, and which as conditions? On what principle is the distinction between resource factors and condition factors based?
3. Give examples of how the same factor affects different bodily functions in different ways.
4. List the quantitative indicators of an ecological factor.
5. In your opinion, which ecological factors play a more significant role in evolution?
6. Provide examples of interactions between ecological factors.
7. What is Liebig's law? Under what conditions does it apply?
8. Define the law of the optimum. What does the graph representing it look like? What is plotted on the x-axis and the y-axis?
9. What is ecological valence? By what other name is this concept known?
10. Is the zone of optimum always constant? What is acclimation? What is its ecological significance?
11. What is "factor compensation"?
12. What are extreme conditions? Give an example.
13. What is generally understood by the "threshold effect"?
14. State the law of tolerance (V. Shelford, 1913).
15. State the law of the combined action of factors (E. Mitscherlich, A. Thienemann, B. Baule).
16. State the law of the indispensability of fundamental factors (according to V.R. Williams, 1949).

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Practical classes 3

Human adaptation to environmental conditions..

The aim of the work to develop in students an understanding of human adaptation to various living conditions (in different environments and geographic zones); to deepen knowledge regarding types of human adaptation and the patterns of geographic variation in body build and metabolic processes.

Key terms: adaptation, genotypic adaptations, phenotypic adaptations, human adaptive type, acceleration..

Quiz Questions

1. Mechanisms of human physiological adaptation to the environment.
2. Human adaptations related to adjusting to geographical conditions.
3. What mechanisms help the human body adapt to constantly changing environmental conditions?
4. What does the concept of "adaptation" mean from an ecological perspective?
5. Environmental changes affect each person differently, yet scientists identify three main types of responses. What criteria are used to distinguish these types?
6. How do genetic and physiological adaptations to geographical conditions manifest in humans?
7. How does an individual adapt to the social environment?
8. What is adaptation?
9. Name the types of adaptation.
10. What are the main ways organisms adapt to their environment?
11. Name their key characteristics.
12. What is an adaptive type?
13. Which of the adaptive types is the least ancient?

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Practical classes 4

Human population and population structure.

The aim of the work To study the key demographic indicators of human populations.

Key terms: species, population gene pool, demography, demographic behavior, genetic drift, migration, density, population waves, population, exponential population growth, age pyramid, "demographic explosion," depopulation, population inertia, age-sex structure, urbanization.

Quiz Questions

1. How does the chemical mechanism of thermoregulation differ from the physical one?
2. How does solar activity affect the human body?
3. How do different weather types manifest their effects on the human body?
4. How does the body's condition change under conditions that are extreme for humans?
5. What is the cause of human diseases known as microelementoses?
6. What are the endemic diseases associated with specific territories and regions?

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Practical classes 5

Anthropoecosystems.

The aim of the work to develop in students an understanding of the anthropo-ecosystem as a subject of study in human ecology and of its structure, and to deepen their knowledge of the key components that make up the structure of anthropo-ecosystems..

Key terms: anthropo-ecosystem, human community, demographic behavior, nature, economy, religion, culture.

Quiz Questions

1. What is the goal of anthropo-ecological research?
2. Provide examples of anthropo-ecosystems at global, regional, and local levels.
3. Characterize the human community as a structural element of an anthropo-ecosystem.
4. Characterize the natural environment as a structural element of an anthropo-ecosystem.
5. What factors determine changes in the territorial boundaries of an anthropo-ecosystem?

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Practical classes 6

Vernadsky's theory of the biosphere and the concept of the noosphere

The aim of the work to elucidate the essence of the theory of the biosphere and the concept of the transition to the noosphere.

Key terms: biosphere, living matter, noosphere, biogenesis, noogenesis, noosphere, technogenesis, psychogenesis, Omega point.

Quiz Questions

1. Define the concept of the "biosphere." What components make up the biosphere? Characterize the properties of the biosphere as a global ecosystem.
2. Where are the upper and lower boundaries of the biosphere located?
3. What is living matter? How does the chemical composition of living matter differ from that of the Earth's crust and other abiotic components?
4. What functions does living matter perform?
5. What are V.I. Vernadsky's biogeochemical principles?
6. Biogeochemical cycles of matter and energy flows as the primary mechanism for maintaining the organization and stability of the biosphere.
7. Which component of the biosphere is classified as bio-inert matter?
8. The essence of the noosphere concept and its scientific status.
9. V.I. Vernadsky's contribution to the noosphere concept. Analyze the conditions identified by Vernadsky for the biosphere to attain noosphere status.

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Practical classes 7

Fundamentals of Environmental Epidemiology (Environment and Health).

The aim of the work to define the concept of "health" and assess an individual's health status. To foster in students an understanding of health, public health, population health, and health levels; the factors determining the level of public health; and types of population health; and to deepen their knowledge regarding the link between regional economic development and population health.

Key terms: health, public health, population health, health status, diseases of civilization, type of population health, disease, occupational disease, endemic disease.

Quiz Questions

1. What is "health"?
2. What categories of health are you familiar with?
3. What is a healthy lifestyle?

4. What factors determine a person's health?
5. What is moral health?
6. Which socio-economic factors have the greatest impact on people's health?
7. Which infectious diseases pose the greatest threat today?
8. What are the underlying causes of the main health problems facing the Russian population?
9. What are sociopathies? Name the main types of sociopathies.
10. Which diseases inflict the greatest damage on Russia's labor potential?
11. Name the main environmentally related diseases.
12. Which types of emergencies are classified as biological emergencies?
13. Define the terms "epidemic," "epizootic," and "epiphytotic."
14. Explain the concept of "contagiousness." How is it measured? What categories of infectious diseases based on this indicator are you familiar with?
15. Name the forms of epizootics based on the scope of the epizootic process.
16. Name the natural foci of plague within the Russian Federation. Which animal species act as vectors for plague pathogens in the North Caucasus? Which types of infectious diseases are characterized by natural focalicity?
17. List the types of classifications for epiphytotics.
18. What role do insects play in the spread of infectious diseases? Provide examples of insects that act as vectors for highly dangerous diseases and insects that are pests of forest and agricultural crops.
19. Are there any patterns in the spread of biological emergencies?
20. Briefly describe the measures taken to contain an epidemiological focus.
21. Briefly describe the measures taken to eliminate an epidemiological focus.

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Practical classes 8

Social aspects of human ecology.

The aim of the work to provide a subjective assessment of a person's lifestyle and somatic health.

Key terms: lifestyle, stress.

Quiz Questions

1. What is a healthy lifestyle?
2. Name the components of a healthy lifestyle.
3. What kind of lifestyle helps maintain health?
4. Name the three stages of stress development.

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Practical classes 9

Environmental aspects of urbanization.

The aim of the work to identify the main anthropogenic factors of urbanization and ways to protect against their impact.

Key terms: urbanization, heavy metals, environmental pollution, environmental problems, xenobiotics, nitrates and nitrites.

Quiz Questions

1. What are heavy metals?
2. Major sources of anthropogenic heavy metal pollution.
3. Why are heavy metals dangerous to humans?
4. How do heavy metals affect the human body?
5. What is anthropogenic pollution?
6. What are ecotoxins?
7. What is pollution?
8. Name the causes and consequences of atmospheric pollution.
9. Name the causes and consequences of hydrosphere pollution.
10. Name the causes and consequences of soil pollution.
11. Name the causes and consequences of biosphere pollution.
12. What hazardous substances are found in automobile exhaust?
13. What effect do these substances have on humans?
14. Which heavy metals are present in automobile exhaust?
15. How does environmental pollution affect human health?
16. What factors of the geographical environment can disrupt the normal functioning of the human body? How do such disruptions manifest?
17. How is the impact of man-made pollution on public health assessed?
18. How do heavy metals, xenobiotics, nitrates and nitrites, and aromatic hydrocarbons affect the human body?
19. How is ecological balance maintained in cities?
20. Major environmental problems of the modern city.

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Recommended Textbooks

- *Understanding Human Ecology: A Systems Approach to Sustainability* (2nd Edition, 2023) by Robert Dyball and Barry Newell . This is a contemporary and highly regarded text that frames human ecology through the lens of complex systems and sustainability. It blends natural, social, and cognitive sciences, making it accessible and relevant for addressing modern global challenges. The second edition includes updated case studies and discussions on policymaking .

- *Human Ecology: Basic Concepts for Sustainable Development* by Gerald G. Marten . This book is praised for its clarity and accessibility, making it an excellent introductory text. It clearly explains fundamental concepts and tools needed to understand the relationship between human societies and ecosystems, using graphics and detailed examples to illustrate sustainable development principles .

- *Fundamentals of Human Ecology* (1998) by Edward J. Kormondy and Daniel E. Brown . A classic textbook designed for undergraduate courses, offering a comprehensive introduction to the field. It presents general ecological principles and then applies them specifically to humans, taking an integrated approach that combines biological ecology with social sciences . Its structured table of contents covers topics like population, adaptation to stressors, and resource acquisition .

Further Exploration & Context

- A Foundational Classic: For historical context, Amos H. Hawley's *Human Ecology: A Theory of Community Structure* (1950) is a seminal work that established a key sociological perspective on the field .

- A Broader Perspective: If you are interested in a more general environmental science textbook that includes a significant human ecology component, Miller & Spoolman's *Environmental Science* (16th Edition) is a widely used standard text that covers topics like sustainability, human population, and environmental hazards

