Translation from Russian into English:

MINISTRY OF HEALTH OF THE KYRGYZ REPUBLIC

I.K. AKHUNBAEV KYRGYZ STATE MEDICAL ACADEMY

Approved by

Rector of I.K. Akhunbaev KSMA,

Doctor of Medical Sciences, Prof. Kudaibergenova I.O.

“01” 09, 2025

WORKING PROGRAM

for the discipline “Sustainable Environmental Management and Climate Strategies in Healthcare”

Faculty | General Medicine

Course | 3

Total workload | 2 credits

Total hours | 60

Lectures | 10

Practical classes | 20

Independent work (IWS) | 30

Form of control | Pass/Fail Test (Zachet)

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Reviewer: Kudayarova M.Zh. - PhD, Associate Professor of the Department of Hygiene, KRSU named after B.N. Yeltsin

1. EXPLANATORY NOTE

“Sustainable Environmental Management and Climate Strategies in Healthcare” is a compulsory interdisciplinary course that forms students' systemic understanding of the relationship between climate change, environmental factors and public health.

Modern healthcare faces unprecedented challenges: growth of climate-related diseases, environmental footprint of medical activities, as well as implementation of digital technologies. A doctor of any

specialty must be able to assess not only the clinical status of the patient, but also the environmental determinants of his health, as well as implement the principles of sustainable development in professional activities.

The course integrates knowledge from ecology, hygiene, public health, information technology and clinical medicine. It forms climate-oriented preventive thinking necessary for work in a changing world.

Goal: To form students' competencies in analyzing and managing environmental and climate risks to public health, as well as applying principles of sustainable development and digital tools in the healthcare system.

Objectives:

1. To study basic concepts of "Green" transition in healthcare and their connection with climate change.

2. To master methods for assessing carbon footprint and life cycle of medical products, waste and energy.

3. To develop skills to use digital technologies to improve sustainability of medical systems.

4. To learn to develop and implement climate-adapted solutions in medical organizations.

5. To develop skills of interdisciplinary project work to create proposals for sustainable development in medicine.

2. PLACE OF THE DISCIPLINE IN THE STRUCTURE OF THE EDUCATIONAL PROGRAM

Prerequisites: Fundamentals of ecology, information technologies in medicine, normal physiology, medical biology, general hygiene (basic knowledge).

Postrequisites: Knowledge obtained within the course deepens preparation for studying specialized clinical disciplines (internal diseases, pediatrics, public health, occupational diseases), and is also used in research work and practical activities of a doctor.

3. COMPETENCIES FORMED AS A RESULT OF MASTERING THE DISCIPLINE

General Competencies (GC) 3: Capable of independent acquisition of new knowledge and its practical application using modern information technologies in professional activities.

Know:_ Main sources of scientific information on sustainable development of healthcare and climate change (PubMed, WHO, Health Care Without Harm, IPCC databases). Modern digital tools for monitoring environmental risks (online carbon footprint calculators, air quality tracking apps, GIS platforms).

Be able to: Independently find and critically analyze scientific information on environmental management and climate strategies.

Possess: Skills of working with modern information systems for monitoring environmental risks.

Professional Competencies (PC) 14, 15, 17 - Prevention, anti-epidemic measures, waste management, energy and water conservation, medical triage in disasters.

4. WORKLOAD

Discipline: Sustainable Environmental Management and Climate Strategies in Healthcare - 10 lectures, 20 practical, 30 IWS, 60 total - Pass/Fail.

5. LECTURE PLAN

1. UN Sustainable Development Goals (SDGs) and medicine. Role of doctor. Life Cycle Assessment (LCA) methodology. Carbon footprint calculation (Scope 1,2,3) - 2h

2. Global climate change as a challenge for public health. Medical waste, energy consumption, water use. Principles of "Green Hospital" - 2h

3. Eco-design and sustainable medical technologies. Green procurement. Reusable vs disposable products. Legal and ethical aspects of green transition. Legislation of KR - 2h

4. Algorithms of behavior and emergency care in climate disasters, natural cataclysms, anthropogenic accidents - 2h

5. Role of digital technologies in sustainable development and health protection. Digital solutions for monitoring and managing environmental risks - 2h

6. PRACTICAL CLASSES PLAN

1. Climate-sensitive diseases: cardiovascular, respiratory, infectious, mental. Impact of extreme temperatures.

2. Air pollution (ground-level ozone, PM2.5, NO2) and its impact on morbidity and mortality.

3. Extreme weather events (heat, floods, drought): adaptation strategies.

4. Medical waste management. Classification, color coding, collection, storage and disposal rules. Safety. Discussion of the “Naryn model” of waste management in KR.

5. Energy efficiency in medical organizations: consumption audit, reduction measures.

6. Water conservation and wastewater management. Water footprint. Problem of micropollutants (pharmaceuticals) and antibiotic resistance.

7. Eco-design and sustainable medical technologies. Green procurement criteria. LCA methodology.

8. Reusable and disposable products, biodegradable materials. Comparative analysis. Break-even point and Total Cost of Ownership (TCO).

9. Analysis of digital environmental data and their impact on public health. Use of GIS.

10. Development of digital solutions for environmental safety. Telemedicine, monitoring systems, wearable devices.

7. INDEPENDENT WORK (Project-oriented learning)

Group project (3-5 people) throughout semester aimed at developing practical proposal to improve sustainability of a specific medical unit.

Stages: Topic selection, Best practices review, Assessment methods application, Proposal development, Presentation preparation, Peer review - Total 30h.

Example topics:

1. “Reducing carbon footprint of surgical department: transition to reusable textiles”

2. “Implementation of separate collection of medical waste in dental clinic”

3. “Telemedicine monitoring program for COPD patients during periods of increased air pollution”

4. “Energy audit and energy saving plan for a typical polyclinic”

5. “Adaptation to heat waves: eco-friendly and safe solutions for therapeutic department”

8. CONTENT OF THE EDUCATIONAL PROGRAM

Topic 1. Introduction to sustainable development of healthcare. UN SDGs and adaptation to healthcare sector. Concept of green transition. Impact of climate change on public health: direct and indirect ways. Concept of "One Health".

Topic 2. Assessment of environmental footprint of medical activity. LCA methodology. Carbon footprint calculation (Scope 1,2,3). Classification and handling of medical waste, energy and water consumption. Principles of "Green Hospital".

Topic 3. Sustainable medical technologies and procurement. Eco-design. Green procurement criteria. Comparative analysis of reusable and disposable products. Biodegradable materials. Circular economy in healthcare.

Topic 4. Legal and ethical aspects of green transition. Legislation of KR in environmental protection. Resolution No.719 "On medical waste management". Ethical dilemmas between patient safety and environmental sustainability.

Topic 5. Adaptation to climate change and emergencies. Algorithms for emergency care in climate disasters. Climate-sensitive diseases. Adaptation strategies. Medical triage in mass admissions. Vulnerable groups and principle of climate justice.

Topic 6. Digital technologies in sustainable healthcare. Telemedicine as a tool to reduce carbon footprint. Electronic medical records. Artificial intelligence for risk forecasting. Big data analysis. GIS in medico-ecological analysis.

9. QUESTIONS FOR FINAL CONTROL (Zachet)

1. Definition of sustainable development. SDGs relevant to healthcare.

2. Role of doctor in achieving environmental sustainability and forming climate-oriented thinking.

3. Concept of “One Health” and its significance for a doctor.

4. Life Cycle Assessment (LCA) of medical products: stages and application.

5. Carbon footprint calculation: Scope 1, 2, 3.

6. Direct and indirect ways of climate change impact on human health.

7. Climate-sensitive diseases: cardiovascular, respiratory, infectious, mental.

8. Classification of medical waste in Kyrgyz Republic (Classes A, B, V, G, D).

9. Rules for collection, temporary storage and disposal of medical waste. Color coding.

10. "Naryn model" of medical waste management: components and results.

11. Main energy consumers in medical organizations (lighting, HVAC, equipment).

12. Principles of energy saving (LED lighting, HVAC automation, heat recovery).

13. Main areas of water consumption in medical organizations.

14. Problem of micropollutants (pharmaceuticals) in hospital wastewater and antibiotic resistance.

15. Principles of "Green Hospital".

16. Eco-design of medical products.

17. Criteria for "green" procurement (green procurement).

18. Comparative analysis of disposable and reusable medical products.

19. Biodegradable materials in medicine.

20. Circular economy in healthcare.

21. Ethical dilemmas between patient safety and environmental sustainability.

22. Legislation of KR in sanitary-epidemiological welfare and environmental protection (Resolution No.719).

23. Medical triage in mass admission of victims in disasters (START color system).

24. Algorithms for doctor's behavior and care in heat wave, flood, earthquake.

25. Vulnerable population groups in climate disasters. Principle of climate justice.

26. Role of digital technologies (telemedicine, AI, big data) in sustainable healthcare.

27. Use of artificial intelligence for forecasting climate-sensitive diseases and resource optimization.

28. Application of geographic information systems (GIS) for medico-ecological analysis.

29. Role of sanitary-educational work of doctor in preparing population for climate change.

30. Development of action plan of medical organization for adaptation to climate change.

10. RECOMMENDED LITERATURE

Basic:

1. Dzhorbaeva A.A., Sultashev A.Zh. et al. "General Hygiene". Textbook for practical classes. Bishkek, 2018.

2. Rumyantsev G.I. et al. "General Hygiene". M.: "Medicine", 2005, 2009.

3. World Health Organization. Environmentally sustainable health systems: a strategic document. Geneva: WHO; 2016. https://www.who.int/publications/i/item/WHOHIS-SDS-2017.6

4. Health Care Without Harm. Health Care's Climate Footprint. 2019. https://noharm.org/global-climate-footprintreport

Additional:

5. Bolshakov A.M. et al. "General Hygiene". M.: "GM", 2009.

6. National Academy of Medicine. A Research Agenda for Climate Change and Human Health. 2025. https://www.ncbi.nlm.nih.gov/books/NBK614580/

7. World Health Organization. WHO global air quality guidelines. 2021. https://www.who.int/publications/i/item/9789240034228

Electronic resources:

KSMA website (www.kgma.kg)

Kyrgyz Virtual Scientific Library (www.kyrgyzstanvsl.org)

KSMA Electronic Library (library.kgma.kg)