# NAVOI STATE UNIVERSITY

## XZEM1304 CONTEMPORARY ENVIRONMENTAL PROBLEMS — COURSE SYLLABUS

### Faculty of Natural Sciences & Medicine | Department of Biology | Program: 60520200 Ecology & Environmental Protection

**COURSE PASSPORT & ACADEMIC METADATA**

**Course Title:** Contemporary Environmental Problems
**Course Code:** XZEM1304
**Course Type**: Mandatory
**Field of Study:** 500000 Natural Sciences
**Field:** 520000 Environment
**Program:** 60520200 Ecology & Environmental Protection
**Academic Year:** 2026–2027
**Semester:** III
**Form of Education:** Full-time
**Language:** Uzbek
**Total Workload Allocation:** 120 Hours (30 Lectures, 30 Practical, 60 Independent Study) | Credits: 4 ECTS
**Aligned UN SDGs**: SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 15 (Life on Land), SDG 11 (Sustainable Cities)




### 1. Course Description & Global Crisis Analysis

This course delivers an in-depth scientific analysis of global, regional, and local environmental crises, including climate change, greenhouse gas accumulation, desertification, transboundary water scarcity, deforestation, biodiversity loss, and waste management.

Aligned with SDG 13, 14, and 15, the curriculum fosters analytical competency in environmental monitoring, risk assessment, ecological forecasting, and green transformation strategies.

## 2. Course Aims & Scientific Competencies

Course Aim: To cultivate expert competence in identifying ecological crises, evaluating human impacts on biosphere balance, conducting environmental risk audits, and formulating sustainable green solutions.

- Ecological Diagnostics & Risk Auditing: Evaluate global warming trends, CO2 emission datasets, air/water pollution indices, and soil salinization maps.
- Sustainable Resource Management: Master principles of sustainable forestry, circular economy, renewable energy transitions, and eco-agriculture.
- Policy & International Collaboration: Interpret UN environmental conventions, SDG indicators, regional climate treaties, and national environmental laws.
- Community Engagement & Green Transformation: Develop eco-advocacy projects, SWOT analysis of urban ecosystems, and local sustainability action plans.

## 3. Prerequisites

Prerequisites: Fundamentals of Ecology (EKA 1206), Soil and Agroecology (TAY 11210).

## 4. Course Structure & Workload Allocation

| Activity Type | Curriculum & Environmental Focus | Workload Allocation |
|---|---|---|
| **Lectures** | Global/Regional Crisis Theory, Policies & SDGs | 30 Hours |
| **Practical / Seminars** | Data Analytics, SWOT Assays & Project Defenses | 30 Hours |
| **Independent Study** | Cooperative Team Projects & Field Audits | 60 Hours |
| **Total Workload** | Full Academic Elective Module (4 ECTS) | 120 Hours |

## 5. Detailed Course Curriculum Outline

### 5.1 Lecture Syllabus Outline

• **L1: Introduction & Scope of Contemporary Environmental Problems:** History, core concepts, global/regional characteristics, and human developmental roles.

• **L2: Biosphere Dynamics & Anthropogenic Impacts:** Biosphere structure, functional balance, human pressure, and ecological equilibrium.

• **L3: Global Climate Change & Ecosystem Consequences:** Greenhouse effect, global warming drivers, ecosystem disruption, and social impacts.

• **L4: Atmospheric Pollution & Air Quality Degradation:** Emission sources, smog formation, acid rain, and stratospheric ozone depletion.

• **L5: Water Resource Crises & Transboundary Governance:** Freshwater scarcity, aquatic pollution, transboundary water disputes, and management.

• **L6: Soil Degradation & Desertification Processes:** Soil erosion, salinization, fertility loss, and socio-economic consequences of desertification.

• **L7: Biodiversity Decline & Conservation Strategies:** Importance of bio-diversity, threatened species, protected area networks, and conservation protocols.

• **L8: Forest Ecosystems & Global Deforestation:** Deforestation drivers, ecosystem services of forests, and afforestation models.

• **L9: Waste Crisis & Circular Economy Models:** Municipal and industrial waste processing, recycling technologies, and green economy principles.

• **L10: Energy Systems & Environmental Security:** Fossil fuels vs. renewable energy sources (solar, wind, hydro), pros and cons analysis.

• **L11: Urbanization & Urban Ecology:** Urban sprawl, transportation emissions, green buffers, and eco-friendly smart city models.

• **L12: Food Security & Agro-Ecological Challenges:** Intensive agriculture, pesticide overuse, agroecology, and sustainable farming systems.

• **L13: Environmental Policy & International Cooperation:** UN environmental conventions, Agenda 2030 SDGs, and international environmental governance.

• **L14: Environmental Risks, Emergency Situations & Monitoring:** Technogenic disasters, risk assessment methodologies, real-time monitoring, and forecasting.

• **L15: Sustainable Development & Green Transformation:** Green technologies, eco-innovations, carbon neutrality, and long-term ecological strategies.

### 5.2 Practical & Seminar Discussion Outline

- Classifying and categorizing global, regional, and local environmental problems.
- Evaluating anthropogenic pressure on biosphere components using schematic models.
- Statistical analysis of global temperature anomalies, CO2 emissions, and glacier retreat.
- Assessing atmospheric air quality indices and mapping urban pollution sources.
- Evaluating water quality indicators and analyzing regional freshwater scarcity challenges.
- Cartographic analysis of soil erosion, salinization, and desertification trends.
- Calculating biodiversity indices and species richness across different ecosystems.
- Formulating conservation guidelines for Red Data Book endangered species.
- Evaluating forest ecosystem services and analyzing the ecological impacts of deforestation.
- Analyzing municipal solid waste composition and designing recycling workflows.
- Comparative eco-efficiency analysis of fossil fuels vs. renewable energy sources.
- SWOT analysis of urban environmental challenges and green infrastructure planning.
- Evaluating the ecological footprints of intensive agriculture, fertilizers, and pesticides.

- Analyzing UN environmental conventions and national commitments under Agenda 2030.
- Environmental risk auditing, monitoring data interpretation, and sustainability proposals.

### 5.4 Independent Study & Analytical Projects

- Analyzing atmospheric air pollution sources and formulating mitigation action plans.
- Evaluating local water resource quality and developing water conservation strategies.
- Studying municipal solid waste composition and designing local sorting/recycling projects.
- Analyzing socio-ecological consequences of global climate change using empirical data.
- Conducting environmental risk audits for industrial enterprises and designing monitoring programs.
- Cooperative Team Project (1/3 module): Designing and defending a green economy project for local communities.

## 6. Recommended Literature & Information Sources


- Egamberdiyeva L.Sh., Egamberdiyev K.F. Urban and Industrial Ecology. Tashkent: Shafoat Nur Fayz, 2021.
- Ro'zmatov E.Yu. et al. Bioecology (Study Guide). Tashkent: Malik Print CO, 2021.
- Hojimatov A.N. Environmental Monitoring. Tashkent: Tafakkur Avlodi, 2020.
- Tursunov X.T., Raximova T.U. Ecology. Tashkent: NIF MSH, 2020.
- Ergashev A.E. General Ecology. Tashkent: O'qituvchi, 2003.
- Smith T.M., Smith R.L. Elements of Ecology (9th Ed.). Pearson Education, 2014.
- Begon M. Ecology: From Individuals to Ecosystems. Blackwell Publishing, 2006.