NAVOI STATE UNIVERSITY

EKA1206 FUNDAMENTALS OF ECOLOGY — COURSE SYLLABUS

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

COURSE PASSPORT & ACADEMIC METADATA

Course Title: Fundamentals of Ecology (EKA1206)

Course Type: Mandatory

Field of Study: 500000 Natural Sciences / 520000 Environment

Program: 60520200 Ecology & Environmental Protection

Academic Year: 2026–2027

Semester: 1

Form of Education: Full-time

Language: Uzbek

Total Workload Allocation: 90 Hours Contact (Lectures, Practical, Lab) + Independent Study

Assessment: Examination

Aligned UN SDGs: SDG 13 (Climate Action), SDG 14 (Life Below Water), SDG 15 (Life on Land), SDG 12 (Responsible Consumption)



1. Course Description & Ecosystem Science

Fundamentals of Ecology provides a holistic foundation in ecological theory, abiotic/biotic environmental drivers, population dynamics, ecosystem energy flow, biogeochemical cycles, global environmental challenges (climate change, Aral Sea crisis, desertification), and environmental impact assessment.

In alignment with SDG 13, 14, 15, and 12, the curriculum equips students with diagnostic tools to evaluate environmental pollution, conduct ecological monitoring, and implement sustainable resource management.

2. Course Aims & Professional Competencies

Course Aim: To cultivate systematic ecological thinking, environmental risk assessment skills, pollution control protocols, and sustainable development principles.

- Core Concepts: Master ecological laws (Liebig's Law of Minimum, Shelford's Law of Tolerance), population ecology, ecological succession, ecosystem stability, and biosphere homeostasis.
- Environmental Protection: Evaluate atmospheric, aquatic, soil, and biological pollution sources, waste management strategies, and renewable energy transitions.
- Monitoring & Legal Frameworks: Understand State Environmental Expertise, ecological monitoring protocols, Red Data Books, and international environmental conventions.
- SDG Competencies: Formulate actionable strategies for climate action, water security, and land degradation neutrality (SDG 13, SDG 15).

3. Prerequisites

Prerequisites: Chemistry (K1106), Physics (F1206), General Biology.

4. Course Structure & Workload Allocation

Activity Type	Contact / Curriculum Focus	Total Hours Allocation
Lectures	Theoretical Ecology & Global Challenges	Contact Hours
Practical Classes	Environmental Policy & Impact Analysis	Contact Hours
Laboratory Classes	Environmental Diagnostics & Monitoring	Contact Hours
Independent Study	Green Building & Plastic Pollution Analysis	Self-Directed Hours

5. Detailed Course Curriculum Outline

5.1 Lecture Syllabus Outline

• **L1: Introduction & History of Ecological Science:** Cultural and historical stages of ecology, scope, objectives, and interdisciplinary ties.

• **L2: Ecological Factors & Fundamental Laws:** Abiotic, biotic, and anthropogenic factors; Liebig's and Shelford's ecological laws.

• **L3: Global Environmental Challenges:** Climate change, ozone depletion, freshwater scarcity, desertification, and soil salinization.

• **L4: Agricultural Ecology & Agrocenoses:** Ecology of agricultural landscapes, sustainable farming, and agro-ecological balance.

• **L5: Biosphere Dynamics & Biogeochemical Cycles:** Vernadsky's biosphere theory, carbon/nitrogen/phosphorus cycles, ecological succession.

• **L6: Natural Resources & Clean Energy Technologies:** Resource classification, renewable energy (solar, wind), and industrial ecology.

• **L7: Atmospheric Protection & Air Pollution:** Atmospheric composition, industrial emissions, greenhouse effect, and air quality standards.

• **L8: Water Resource Management & Aral Sea Crisis:** Water availability in Uzbekistan, wastewater treatment, and the Aral Sea disaster.

• **L9: Soil Degradation & Erosion Control:** Soil erosion (wind, water), land degradation, and soil conservation methods.

• **L10: Biodiversity Protection & Red Data Books:** Flora and fauna conservation, endangered species management in Uzbekistan.

• **L11: Protected Natural Areas (PAs):** Nature reserves (zapovedniks), national parks, wildlife sanctuaries, and biosphere reserves.

• **L12: Environmental Monitoring & State Expertise:** Monitoring networks, State Environmental Expertise, and economic mechanisms in conservation.

• **L13-L14: International Environmental Cooperation:** Global environmental organizations, conventions (UNFCCC, CBD, UNCCD), and international law.

5.2 Practical & Laboratory Outline

- Measuring abiotic environmental factors (temperature, light intensity, humidity).
- Evaluating dust and particulate pollution levels in ambient air.
- Acoustic ecology: Measuring ambient noise levels using decibel meters.
- Visual and chemical assessment of surface water pollution.
- Soil mechanical composition and texture determination.
- Solid waste sorting, categorization, and recyclable material analysis.
- Population age structure determination and ecological pyramid construction.
- Mapping regional environmental hot spots using ecological risk maps.

5.3 Independent Study & Case Study Tasks

- Research report on Green Building technologies and sustainable urban architecture.
- Analytical report on plastic pollution dynamics and eco-friendly biodegradable alternatives.
- Industrial environmental risk analysis and hazard assessment for chemical enterprises.
- Data collection report on municipal solid waste generation and recycling infrastructure in Navoi region.

6. Recommended Literature & Information Sources

- Boyirov Z.R. Fundamentals of Environmental Management (Textbook). Qarshi, 2024.
- Boyirov Z.R., Kilicheva D.I. Engineering Ecology (Study Guide). Qarshi, 2024.
- Yormatova D.Yo., Xushvaqtova X.S. Ecology and Nature Protection. Tashkent, 2018.
- Ergashev A.E. General Ecology. Tashkent: O'qituvchi, 2003.