MINISTRY OF EDUCATION AND SCIENCE OF UKRAINE

V. N. KARAZIN KHARKIV NATIONAL UNIVERSITY

CONFIRMED

Academic Council of

V. N. Karazin Kharkiv National University

“\_\_\_\_” \_\_\_\_\_\_\_\_\_\_\_\_\_ 20\_\_\_

protocol №\_\_\_

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by order of \_\_\_\_\_ 20\_\_ № \_\_\_\_\_\_\_\_\_\_\_\_

Vice-Rector for Research and Academic Affairs

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Name, SURNAME)

MICRO-SQUALIFICATION PROGRAM

***Remote environmental monitoring***

NATIONAL QUALIFICATIONS FRAMEWORK LEVEL \_\_\_\_\_7\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(5, 6, 7, 8 level)

QUALIFICATION TYPE \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_professional\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(educational or professional)

CATEGORY OF QUALIFICATION \_\_\_\_\_\_\_\_\_\_\_microqualification\_\_\_\_\_\_\_\_\_\_\_\_

(partial qualification or micro-qualification)

QUALIFICATION Specialist in Remote environmental monitoring\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(title of qualification)

**Kharkiv 2026**

**Profile of the program**

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| **1. General information** | | |
| **Head of the program** | | 1. Anastasiia Klieshch, PhD in Geography, Associate professor of the Department of Environmental Monitoring and Protected Areas Management. |
| **Members of the program development working group** | | 1. Nadiya Maksymenko, Doctor of Geography, Professor, Head of the Department of Environmental Monitoring and Protected Areas Management. 2. Alina Hrechko, PhD in Earth Sciences, Associate Professor of the Department of Environmental Monitoring and Protected Areas Management. |
| **Full name of the higher education institution and structural unit where the program is implemented** | | V. N. Karazin Kharkiv National University, Institute of Environmental Sciences, Green Energy, and Sustainable Development, Department of Environmental Monitoring and Protected Areas Management. |
| **National Qualifications Framework Level** | | 7 (NQF Ukraine), Second cycle (QF-EHEA),  7 (EQF-LLL) |
| **Official name of the program** | | Remote environmental monitoring |
| **Type of document issued and scope of the program in ECTS credits and academic hours** | | Certificate  3 ECTS, 90 hours |
| **Language(s) of teaching /assessment** | | Ukrainian / Ukrainian |
| **2. Program goal** | | |
| *The aim of the educational program is to develop a comprehensive system of knowledge and practical skills among higher education students and environmental professionals in the application of Remote Sensing (RS) methods and geographic information (GIS) technologies for environmental monitoring. The program is designed to facilitate the digital transformation of environmental monitoring through the implementation of satellite imagery analysis algorithms, contributing to objective environmental assessments, effective forecasting of ecological threats, and evidence-based decision-making for nature conservation and sustainable territorial development.* | | |
| **3. Characteristics of the program** | | |
| **Orientation, features and objectives of the program** | | *The micro-credential program is designed to train professionals capable of integrating remote sensing methods into environmental monitoring practices. A distinctive feature of the program is the synergy between an academic foundation and the mastery of GIS tools for analyzing large-scale satellite datasets, enabling both long-term observation and rapid environmental assessment. The key objectives focus on developing advanced skills in remote sensing data analysis for comprehensive environmental monitoring.*  *The program provides for international participation in the development and teaching of the Erasmus+ project «DOMANI – Developing Micro-credentials Ecosystems in Ukraine and Mongolia for Competitive and Resilient Green Economies».* |
| **The main focus of the program** | | *Scientific and methodological substantiation and practical application of Remote Sensing (RS) technologies for monitoring ecosystem processes, assessing anthropogenic impact, and developing strategies for sustainable environmental management.*  *Keywords: Remote Sensing (RS), GIS, environmental monitoring, spectral indices, spatial analysis, ecosystem processes, environmental state.* |
| **4. Teaching and assessment** | | |
| **Teaching and learning** | | *Core Teaching Approaches:* *Student-centered and activity-based learning; problem-oriented and project-based learning; integration of distance learning with practical work using GIS platforms.*  *Educational Technologies: Information and communication technologies (Big Data processing), interactive visualization of geodata, and case studies focused on rapid environmental monitoring.* |
| **Assessment** | | *A 100-point grading system is applied through a cumulative point-based assessment, including the following types of control: continuous assessment (written quizzes and surveys), intermediate control (defense of practical and independent assignments, participation in group discussion, and mid-term tests), final assessment (standardized testing).* |
| **5. Program competencies or job functions** | | |
| **General competencies** | GC 6. Ability to search, process, and analyze information from various sources and visualize data. | |
| **Professional competencies** | PC 4. Ability to apply innovative approaches to the analysis and forecasting of complex phenomena, and to critically reflect on problems within professional activities.  PC 7. Ability to organize work related to the assessment of the environmental state and nature conservation under conditions of incomplete information.  PC 10. Ability to evaluate the level of negative impact of natural and anthropogenic environmental hazards on the environment and human health. | |
| **DOMANI - competencies** | DC 1. Ability for rapid upskilling in the field of Remote Sensing (RS) and GIS to address contemporary challenges in environmental monitoring.  DC 2. Ability to apply automated processing methods and cloud technologies for environmental data analysis based on dynamic information systems. | |
| **6. Program learning outcomes** | | |
| **Program learning outcomes** | PLO 6. To know modern methods and instrumental tools for environmental research, including methods and tools for mathematical and geographic information (GIS) modeling.  PLO 11. To be able to use modern information resources related to ecology, environmental protection, and sustainable nature management.  PLO 18. To be able to use modern methods of information processing and interpretation for innovative activities. | |
| **DOMANI - Program Learning Outcomes** | DPLO 1. To be able to develop structured digital geospatial databases for the information support of environmental monitoring systems.  DPLO 2. To be able to interpret the results of digital remote sensing (RS) analysis to substantiate management decisions within the context of sustainable development and environmental security. | |
| **7. Resource provision for program implementation** | | |
| **Human resources** | Lecturers hold advanced academic degrees and/or academic titles, including Doctors of Science and Candidates of Geographical Sciences (PhD), as well as Doctors of Philosophy (PhD). All teaching staff members, who are full-time employees of V. N. Karazin Kharkiv National University, regularly undergo professional development and training relevant to the program's subject matter. | |
| **Material and technical support** | To ensure the development of subject-specific competencies, the program provides access to specialized computer laboratories equipped with high-speed internet for processing large-scale satellite datasets. Technical resources include personal computers with pre-installed specialized software (QGIS, ArcGIS, ERDAS IMAGINE) and access to cloud computing platforms (including Google Earth Engine) for remote sensing data processing. Instruction is supported by multimedia visualization tools for analyzing cartographic materials and demonstrating spatial modeling results. | |
| **Information and educational and methodological support** | Information regarding the micro-credential program is available on the official websites of V. N. Karazin Kharkiv National University (<https://karazin.ua/>), the Karazin Digital Learning Support Center (<http://moodle.karazin.ua>), and the Institute of Environmental Sciences, Green Energy, and Sustainable Development (<http://ecology.karazin.ua>). | |

1. **List of program components**

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| --- | --- | --- | --- |
| **Course/ Code** | **Program Components (сourses, topics, assignments, practical component, assessment)** | **Number of ECTS Credits** **/ Hours** | **Type of Control** |
| EC. 1 | Fundamentals of Remote Environmental Monitoring | 1/30 | Test |
| EC. 2 | RS Technologies for Ecosystem Processes Analysis | 0,5/15 | Test |
| EC. 3 | RemoteEnvironmental Monitoring & Solutions | 0,5/15 | Test |
| PС. 1 | *Practical Component* | 1/30 | Pass/Fail with Grade |
| FА. 1 | *Final Assessment Exam* |  | Test |
| **TOTAL PROGRAMME VOLUME: 3/90** | | | |

1. **Form of attestation according to the program**

The final assessment is conducted in the form of a final exam consisting of a comprehensive test, which includes both theoretical and practical questions.

1. **Program verification**

Head of the program \_\_\_\_\_\_\_\_\_\_\_\_\_ Anastasiia KLIESHCH

(signature) (Name, SURNAME)

Considered at the department meeting \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

from «\_\_\_» \_\_\_\_\_\_ 20\_\_ , protocol № \_\_\_

Head of the Department \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Nadiya MASKYMENKO

(signature) (Name, SURNAME)

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