

Navoi State University – Hydrology

Program Duration: 2 years

Mode of Study: Full-time

Program Code: 70530401

Total Workload: 120 ECTS credits

ECTS credits per semester: 30

Overview

The Master's degree program in **Hydrology** (Program Code: 70530401) at Navoi State University is a two-year, full-time academic program comprising a total workload of 120 ECTS credits (30 ECTS per semester). The program is designed to prepare highly qualified hydrologists, water resources specialists, hydrochemists, environmental risk analysts, and scientific researchers equipped with advanced knowledge in surface water hydrology, river basin management, hydrochemistry, water modeling, and GIS-based spatial analysis.

The curriculum integrates theoretical hydrology, field-based hydrometry, laboratory hydrochemical analysis, and numerical modeling. Students gain hands-on expertise in monitoring river discharge, assessing water quality, forecasting flood and drought events, modeling runoff processes, and designing integrated water resources management (IWRM) strategies. The program places strong emphasis on addressing acute regional hydrological challenges in Uzbekistan, including water scarcity, Aral Sea basin ecological restoration, transboundary river management, and climate change impacts on Central Asian glaciers and water systems.

Graduates of this program are fully equipped to pursue careers as hydrological engineers, water quality analysts, environmental consultants, GIS hydrologists, research scientists in scientific institutes, and academic staff in higher education institutions, as well as to continue their studies at the doctoral (PhD) level.

Assessment

A comprehensive and multi-component assessment system is applied in the Master's program in Hydrology to ensure continuous learning, field/laboratory technical competence, and scientific rigor.

1. Course-based assessment

- **Presentations and seminars** – assess students' ability to present, analyze, and defend hydrological research, hydrochemical models, river basin studies, and environmental impact assessments in academic settings.
- **Mini-tests, quizzes, and oral exams** – monitor understanding of core theoretical concepts, fluid mechanics, hydrodynamics, hydrochemistry, water balance equations, and hydrometeorology.
- **Midterm and final examinations** – evaluate theoretical depth, laboratory water analysis capabilities, and hydrological forecasting skills through written exams and computational lab tests.

- **Portfolio assignments** – compile field hydrometric logs, hydrochemical lab test reports, runoff simulation models, GIS water flow maps, and research paper drafts demonstrating progressive skill development.
 - **Independent assignments** – encourage independent hydrological literature reviews, climate impact modeling, statistical water data processing, and watershed management planning.
2. **Research-based assessment**
- **Scientific Research Work (ITI)** – evaluated through research proposals, field expedition reports, hydrological software model verifications, and defense of research outcomes before the department.
 - **Scientific and Pedagogical Work (IPI)** – evaluated via teaching practice, preparation of practical hydrology lab manuals, field guides, and academic reporting.
 - **Master’s Thesis (MD/M)** – evaluated based on overall scientific rigor, practical relevance to water resources, computational modeling accuracy, thesis writing quality, and public defense before the State Attestation Commission.
3. **Practice-based assessment**
- **Field and Industrial Practice** – evaluated through performance in hydrometeorological service stations (Uzhydromet), water management organizations, environmental protection agencies, and research institutes, accompanied by comprehensive practice reports.
 - **Pre-graduation practice** – assessed on the integration of field/laboratory hydrological research results and final thesis preparation.
4. **Work-integrated learning**
- **Water Resources & Modeling Projects** – assessed on analytical precision, innovative use of GIS and hydrological software, field measurement accuracy, and practical alignment with sustainable water management needs.

Academic Requirements

Admission Requirements - Applicants applying for the Master’s degree program in Hydrology (Code: 70530401) must satisfy the following criteria:

- **Educational background** – A Bachelor’s degree (or equivalent qualification) in hydrology, hydrometeorology, geography, environmental science, water management engineering, ecology, or related natural/engineering science fields from a recognized higher education institution.
- **Academic excellence** – Applicants holding an honors diploma (*imtiyozli diplom*) are eligible for preferential admission according to current regulations of the Ministry of Higher Education, Science and Innovation of the Republic of Uzbekistan.
- **Language proficiency** – A valid national or international certificate demonstrating at least B2-level foreign language proficiency (CEFR, IELTS, TOEFL, etc.) in English, Russian, or another recognized foreign language.

Graduation Requirements

To be granted the Master of Science degree in Hydrology, students are required to:

- Complete all compulsory and elective modules specified in the curriculum, accumulating a total of **120 ECTS credits** (30 ECTS per semester).
- Maintain standard academic standing according to Navoi State University regulations (passing marks in all subjects).

- Successfully complete all practical trainings (field hydrometric expeditions, research practice, and pre-graduation practice) with positive performance evaluations.
- Fulfill all research requirements (Scientific Research Work and Scientific-Pedagogical Work).
- Prepare, submit, and successfully defend a **Master's Thesis** demonstrating original field, laboratory, or computational hydrological research before the State Attestation Commission.
- Pass all required state attestation processes.

Courses Offered

Year 1

Compulsory:

- Research Methodology and Technical Writing in Hydrology
- Reforms in the Education System under the Development Strategy of New Uzbekistan
- Advanced Land Hydrology and River Hydraulics
- Hydrochemistry and Water Quality Assessment
- Hydrological Forecasting, Flood Risk, and Drought Management

Elective:

- GIS and Remote Sensing Technologies in Hydrology and Water Resources
- Runoff Formation Modeling and Watershed Dynamics
- Groundwater Hydrology and Hydrogeology
- Regulatory Documents, Water Law, and Transboundary Water Governance
- Hydrometeorological Monitoring and Field Measurement Technologies

Year 2

Compulsory:

- Integrated Water Resources Management (IWRM) in Arid Zones
- Hydroecology and Ecological Restoration of Water Bodies
- Climate Change Impacts on Hydrological Systems and Glaciology

Elective:

- Mathematical Modeling of Hydrological Processes (HEC-RAS, SWAT)
- Hydro-Informatics and Statistical Methods in Water Data Processing
- Reservoir Operations, Dam Safety, and Hydraulic Structure Impact
- Professional Morality and Ethics in Environmental Science
- Industrial Wastewater Treatment and Hydrochemical Diagnostics
- Water Resource Management in the Aral Sea Basin
- Urban Hydrology and Stormwater Infrastructure Management

Career Opportunities

Graduates of the Master's degree program in Hydrology acquire comprehensive field investigation, hydrochemical analysis, and numerical modeling capabilities, enabling them to pursue careers across environmental, water management, industrial, governmental, and academic sectors:

- **Hydrological Research Scientist / Senior Specialist** at the Center of Hydrometeorological Service of Uzbekistan (Uzhydromet), Institute of Water Problems and Land Reclamation, and Academy of Sciences institutes.
- **Water Resources Engineer / Specialist** in the Ministry of Water Resources of the Republic of Uzbekistan, regional basin management organizations, and reservoir operation authorities.
- **Environmental & Water Quality Analyst** in the Ministry of Ecology, Environmental Protection and Climate Change, environmental monitoring laboratories, and industrial combines (e.g., NGMK, AGMK).
- **Hydrology Lecturer / Instructor** in higher education institutions, geographical colleges, and specialized vocational technical centers.
- **GIS Hydrologist / Spatial Data Analyst** in land cadastre agencies, urban planning institutes, and environmental consulting companies.
- **Hydrological Modeler / Flood Risk Analyst** in civil engineering firms, dam safety inspection agencies, and disaster management organizations (Ministry of Emergency Situations).
- **Water Project Specialist / Coordinator** in international environmental and development organizations (UNDP, FAO, World Bank, GIZ, IFAS) working on Central Asian water security.
- **Independent Water & Ecological Consultant** providing advisory services on water quality certification, irrigation water assessment, and environmental impact audits.

Tuition Fees

- **For local students:** Approximate annual tuition – 9,700,000 UZS.
- **For international students:** Approximate annual tuition – 774.28 USD.

(Note: Tuition fees are subject to adjustment in accordance with university policy and foreign currency exchange rates.)

Learning Outcomes

Master's Degree in Hydrology

Upon successful completion of the program, graduates will be able to:

1. Knowledge

- **1.1.** Demonstrate advanced knowledge of land hydrology, hydrodynamics, river hydraulics, hydrochemistry, and groundwater-surface water interactions.
- **1.2.** Understand principles of integrated water resources management (IWRM), water balance calculations, and transboundary water agreements in Central Asia.
- **1.3.** Explain hydrochemical principles, water pollution mechanics, aquatic eco-system health, and hydro-ecological degradation processes.
- **1.4.** Demonstrate knowledge of modern hydrological software tools (HEC-RAS, SWAT), GIS spatial analytics, remote sensing platforms, and hydrometeorological sensor technology.
- **1.5.** Recognize national laws, international water treaties, environmental safety standards, and climate adaptation frameworks in Uzbekistan.

2. Skills

- **2.1.** Perform field hydrometric measurements, discharge gauging, water sampling, and hydrochemical analysis using modern laboratory equipment.
- **2.2.** Build, calibrate, and validate numerical runoff models, flood forecasting tools, and river hydraulic simulations using digital software.
- **2.3.** Apply GIS tools and satellite remote sensing data to map river basins, track glacier retreat, and monitor surface water bodies.
- **2.4.** Formulate sustainable water distribution plans, flood mitigation strategies, and ecological flow requirements for arid land river basins.
- **2.5.** Prepare professional hydrological reports, hydrochemical certificates, environmental impact assessments, and publishable scientific research papers.
- **2.6.** Effectively present hydrological research results, water emergency forecasts, and conservation strategies to policy-makers, industrial managers, and scientific audiences in national and foreign languages.

3. Competences

- **3.1. Hydrological & Research Competence** – Conduct independent, scientifically grounded, and safe field and laboratory research to address critical water resource challenges.
- **3.2. Water Governance & Engineering Competence** – Manage hydrological monitoring stations, direct hydrochemical laboratories, and lead integrated watershed management projects in government and corporate sectors.
- **3.3. Methodological & Educational Competence** – Teach hydrology, hydrochemistry, and environmental sciences in academic institutions using interactive field and lab-based methods.
- **3.4. Environmental Leadership Competence** – Lead multidisciplinary teams in river basin restoration, flood risk assessment campaigns, and sustainable water infrastructure planning.
- **3.5. Ethical & Environmental Stewardship** – Uphold high ethical standards, environmental safety regulations, commitment to water security, and fair resource allocation ethics.
- **3.6. Lifelong Learning Competence** – Continuously upgrade technical, computational, and field qualifications through ongoing scientific research, international hydrological conferences, and professional development programs.