

Division: *Institute of Natural Sciences and Mathematics*

Academic programme: *05.04.06 Ecology and Use of Natural Resources, Reagent-free (Photocatalytic) Water Treatment*

Mode of study: *full-time*

Programme length: *2 years*

Programme level: *Master's degree*

Language of instruction: *Russian*

Programme description: *The educational programme is carried out in the form of project-based learning.*

The goal of the project is to develop and implement a new reagent-free, waste-free approach to the photocatalytic destruction of difficult-to-oxidize organic pollutants.

Project objectives:

- *adjusting the properties of catalysts for the destruction of phenol and cyanides, while the presence of other industrial impurities should not interfere with the main process of destruction;*
- *study of the kinetics of photodegradation, the kinetics of deposition of catalyst granules, the development of a mathematical model for the processes of water purification and the extraction of catalyst grains, the theoretical and experimental determination of the optimal performance characteristics of the granules;*
- *calculation, design development and manufacturing of a pilot water treatment plant according to the requirements of Magnitogorsk Iron & Steel Works;*
- *development of a method for modifying the surface of photocatalysts to give them the required properties;*
- *development of a line of catalysts for specific production;*
- *involvement of other industrial partners;*
- *creation of a high-tech enterprise for the production of catalysts.*

Each Master's degree student performs work in the direction associated with subsequent professional activities.

Objects of professional activity of the students:

- *biological and chemical objects and their impact on the environment;*

- *methods and devices for monitoring pollution of gas, solid and liquid components of production and the environment;*
- *waste disposal and recycling systems;*
- *methods and means of protecting the environment from anthropogenic impact.*

The academic programme involves project-based learning.

Main programme-specific classes:

- *Special Methods of Wastewater Treatment in Industry*
- *Methods of Industrial Wastewater Treatment*
- *Assessment of Environmental Safety When Introducing New Technologies*
- *Modern Methods of Water Conditioning and Purification*
- *Anthropogenic Environmental Pollution*
- *Innovative Technologies for Processing Agricultural Waste*
- *Environmental Management of an Enterprise*
- *Modern Problems of Ecology and Use of Natural Resources*
- *Environmental Problems in Russia*
- *Rational Use and Protection of Lands*
- *International Cooperation in the Field of Resource Conservation*
- *Ultra- and Nanodisperse Systems and Technologies*
- *Geoecology of Water Bodies*

Programme manager: *Viacheslav V. Avdin, Doctor of Sciences (Chemistry), Associate Professor, Head of the Department of Ecology and Chemical Engineering*