

# Chemistry

South Ural State University

Degree or qualification is awarded: **Master's degree**

Language of study: **Russian**

Mode of study: **full-time**

Duration: **2 years**

Availability of free education: **yes**

Price: **161 600 Russian rubles**

Programme webpage at the university website:

<https://www.susu.ru/en/education/masters-degree-programs/040401-chemistry-chemistry-environmental-engineering>

Programme curator: **Olga Sharutina**

Tel.: **+7(351)267-95-76**

E-mail: [sharutinaok@susu.ru](mailto:sharutinaok@susu.ru)

The program encompasses basic training in organic chemistry (analysis of organic compounds, organic synthesis, chemistry of heterocyclic compounds, theoretical foundations of organic chemistry, methods of elemental organic chemistry, etc.) with the study of such disciplines as nanochemistry, supercomputer modelling, chemical problems of ecology, etc. The graduate has all necessary knowledge to perform professional activities in the field of chemical theory, chemical synthesis, ecology, pharmaceutical and medical chemistry, expert standards and certification.

During training, students gain the valuable theoretical knowledge and practical skills for professional activities, in particular, they systematically study methods of nuclear magnetic resonance, mass chromatography, mass spectrometry, infrared and ultraviolet spectroscopy and X-ray analysis, which are necessary for working in modern analytical laboratories.

Master's program graduates can either continue their education as postgraduate at the South Ural State University, the Ural Federal University, the Institute of Organic Synthesis, Ural Branch of the Russian Academy of Sciences (Yekaterinburg), the Institute of Organic Chemistry of the Russian Academy of Sciences (Moscow), and work in various chemical laboratories associated with the synthesis and analysis of organic and organometallic compounds, in particular, in the forensic departments, in the laboratories of the centres of hygiene and epidemiology, forensic examination, in the quality and control departments at pharmaceutical plants, etc.

Research at the Department of Theoretical and Applied Chemistry is conducted in the following areas: Development of methods for the directed synthesis of organoelemental compounds with practically significant properties, Development of methods for multiscale (from subatomic to macro-object) supercomputer modeling, Creating new heterocyclic systems as promising biologically active substances underlying modern drugs, Electrochemistry of metals, alloys and carbon materials.

Students take an active part in scientific research, have joint scientific publications with teachers, present their own scientific work at national and international conferences. For the best student work they are awarded with diplomas, awards and prizes at various competitions and All-Russian conferences.

## Specializations within this programme

### Organic Chemistry

#### 04.04.01 Chemistry (Chemistry for Environmental Engineering)

The program is unique in including training courses embracing the most up-to-date methods of environmental protection. The lectures will be delivered by leading world scientists with  $H_i > 20$ .

The area of professional practice for Masters of Science after this educational program is the modern high-tech enterprises using the modern chemistry advances for environmental protection (in petrochemistry, metallurgy and

pharmaceutics).

The program includes the courses that make it possible to learn:

- existing high-tech methods of environmental protection, energy- and resources-saving technology, based on the modern chemistry advances: the use of nanostructured (photo)catalysts for destruction of organic pollutants that are resistant to oxidation, the electrochemical methods of emission and decomposition of pollutants, the modern photovoltaic systems for solar energy conversion;
- methods of production and investigation of ultradispersed and nanostructured materials for environmental protection;
- methods of evaluating environmental conditions, of analysis for the most dangerous toxicants, of physicochemical environmental study, and of planning engineering activities to decrease environmental pollution;
- new progress in synthetic chemistry, development of green chemistry as a new research area.

During the studies the scientific research work is mandatory for master's degree.

The fields of research:

- Synthesis and application of heterogeneous (photo)catalysts for environment protection processes.
- Study of environmental pollutants with the view of their recycling and deactivation.
- Modern photovoltaic materials for energy-saving technology.
- New microporous materials for electrochemical decomposition of pollutants in water.

The purposes of research work are regularization, consolidation, and reinforcement of professional knowledge, formation of expertise in independent research in the chosen field of chemistry, as well as attainment of skills in preparing the graduate qualification work (master's thesis).