Innovative materials and methods of their research

Kazan (Volga Region) Federal University

Degree or qualification is awarded: **Master**

Language of study: **Russian**
Mode of study: **full-time**
Duration: **2 years**
Availability of free education: **no**
Price: **180 840 RUB per year**

Programme webpage at the university website:
https://kpfu.ru/eng/academic-units/natural-sciences/alexander-butlerov-institute-of-chemistry/studies

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The purpose of the educational program:

Comprehensive and high-quality training of qualified competitive specialists with deep knowledge of modern physicochemical and physical methods of analysis of the substances and skilled in the use of modern equipment employed in different fields of Chemistry, Biology, Medicine, Petrochemistry, and Geology, in the field of development and research of properties of modern materials, as well as composite or nanomaterials.

Why is it worth choosing this program?

Due to complex approach to education and significant part of practices, laboratory and practical studies governed by leading specialists in curriculum, the master students will receive comprehensive conceptions on modern methods of chemistry that offer for them further carrier in special laboratories of industrial enterprises and higher education institutions. In the era of the rapid development of science and technology, automation of industrial processes, the development of new technologies, the discovery of innovative materials, the need for highly qualified specialists who are able to solve current production problems, and control and improve the properties of existing materials, as well as create new composites and nanomaterials.

Educational process.

Students study *basic courses*: foreign language, philosophical problems of chemistry, computer technologies in science and education, modern theory of chemical bonds.

The variable part includes selected chapters of analytical chemistry, methods of environmental monitoring, fundamentals of materials science, fundamentals of physical chemistry, fundamentals of petrochemistry, modern chemical production, scanning probe microscopy and X-ray powder diffractography of substances and materials, etc.

Special courses, including:

- Voltammetry in biology and medicine

- Thermal analysis of substances and materials: thermogravimetry, differential scanning calorimetry, combined methods

- Composite materials

- Flow analysis methods

- Gas chromatography

- Methods for the control of materials and composites

- Methods of magnetic resonance, vibrational spectroscopy, X-ray diffraction

- Modern problems of food analysis

- Technologies for the preparation of nanodispersions of substances and composite materials

- Functional nanomaterials, etc.

Skills that students will acquire after completing an educational program:

Master students will be prepared to participate in the studies of chemical processes observed in natural and laboratory conditions, to the development of novel and perfecting existing methods of the analysis of various subjects; to the search of the relationships of the analysis and interpreting data obtained. In the framework of their competencies, they will be able to collect and consider literature, plan experiments, analyze the results obtained and prepare recommendations for their use in real economy. They will be able also to conduct research and teaching in the specialized secondary education institutions.
Graduates will master the work on modern, often unique, equipment produced by the best Russian and foreign companies, modern approaches to solving urgent problems demanded by employers in various fields of chemistry, biology, medicine, petrochemistry, geology.

Professional Areas Where Graduates Have Advantages

Government laboratories authorized in the analysis of foodstuffs, environment and industrial materials and raw matters are the employers of the Master students graduated from this program. They can work in Academy of sciences institutions and leading research centers involved in the investigation relate to analytical chemistry, biology, medicine, petrochemistry, geology, in the system of transfer from science to the industry of innovative technologies in the field of development of composite materials (technology transfer centers, specialized companies and funds).

Specializations within this programme