

Metallurgy

South Ural State University

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

Language of study: **Russian**

Mode of study: **full-time**

Duration: **2 years, or 2 years and 6 months years**

Availability of free education: **no**

Price: **151 800 rubles**

Programme webpage at the university website:

<https://www.susu.ru/en/education/masters-degree-programs/220402-metallurgy-theory-and-advanced-technologies-foundry>

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Metallurgy is the backbone of the economy of all developed countries.

In turn, metallurgy became the main foundation of machine-building for the industrial sector (car and tractor building, aviation construction, agricultural vehicle construction, shipbuilding, machine-tool building, energy and chemical engineering, military technology, construction technology, metallurgical and mining equipment, etc.) and its development depends on the rate of growth of the country's machine-building complex as a whole.

Graduates of the master's program "Steel metallurgy" aim toward scientific research work.

The wide range of disciplines allow for the formation of the main skills for other kinds of work as well, such as organizational management and design) Qualified specialists of this program are able to adapt quickly to the technological conditions of manufacturing, develop progressive technological processes taking ecological needs and economic efficacy into account, do applied research, and also develop projects for reconstruction of existing, as well as the building of new, steelmaking plants using modern tools and materials.

Specializations within this programme

Steel Metallurgy

Metallurgy (Development of Pyrometallurgical and Foundry Processes in the Context of Digital Industry)

This programme aims at training highly qualified and competitive (in the regional and federal labour markets) specialists in the field of modern metallurgical production, who meet the professional standards. The programme focuses on forming the theoretical and technological base of the processes of producing ferrous metals and alloys based on them, high-quality casting from the alloys of ferrous and non-ferrous metals, as well as on providing applied and methodological knowledge on organizing and performing research-and-development work, and solving production-and-technology tasks.

Metallurgy (Technology and Digital Models of Thermal and Thermomechanical Treatment)

This programme aims at training highly qualified specialists (metal scientists), who are in demand at enterprises in the metallurgical industry of the Ural region. While mastering this programme, the students are preparing to solve tasks of research-and-development and technological activity. This Master's degree programme implies the format of project-based learning with in-depth training of the Master's degree students for their professional activity through their direct participation in solving the tasks on controlling the structure and properties of the items produced from metal materials.

The scientific goal of the project being fulfilled is to create computer (digital) models of the thermomechanical and/or thermal treatment of the piping products based on the physical simulation of the technological processes. In the course of fulfilling the project the students will conduct the experimental research on the deformation behaviour of the pipe steels, will study the evolution of the structure of the pipe steels in the process of hot rolling and/or thermal treatment. Based on the experimental research, digital models will be created allowing to optimize the modes of the technological processes of rolling and thermal treatment, and thus, to improve the quality of the manufactured products. The possibilities of the new methods of thermomechanical and thermal treatment will be studied for the pipes in the oil-and-gas industry.

The experimental part of the project-based learning will be fulfilled with the use of modern equipment, including the Gleeble 3800 physical simulator of thermomechanical processes, the complex of digital optical microscopy, and the furnace and testing equipment of the Department of Materials Science, Physical and Chemical Properties of Materials. A series of research and testing will be conducted at the ChelPipe's Testing Centre.

Theory and Progressive Technologies in Foundry Production

Metallurgy (Digital Technologies in Rolling-Mill Production and their Materials-Science Support)

This educational programme is being fulfilled in the format of project-based learning and aims at training students for production-and-technology, project, organisational-and-managerial, and research-and-development activity after they graduate. Taking into account the fact that modern rolling-mill production is highly automated and is meant not only to change the shape of metals, but also fulfil the structure- and properties formation in the process of pressure-treatment of metals, then studying in this Master's degree programme will allow the graduates to significantly improve their competitiveness in the labour market.

Today, there are practically no institutions training specialists capable of designing and optimizing the high-speed processes of controlled rolling and thermal strengthening of the rolling-heat products, while there is a demand for them with the metallurgy enterprises. Within the fulfilment of the project-based learning and using the example of certain production tasks, the students will be studying computer and physical simulation of the processes of pressure-treatment of metals and thermomechanical treatment, the designing of the technological modes of rolling and accelerated cooling, and will also master all the currently available methods of quality control of the rolling-mill products.

For the students' internship, course and diploma designing, the Department has both close long-term ties with Chelyabinsk Pipe-Rolling Plant and the Russian Research Institute of the Tube & Pipe Industries, and close ties with the SUSU innovation laboratories, which help students conduct research-and-development works.

Metallurgy (Theory and Advanced Technologies of Foundry)

The educational program is developed on the basis of FSES 3+ taking into account needs of the regional labor market, traditions and achievements of scientific and pedagogical school of the University in accordance with requirements of the Federal legislation.

The field of professional activity of graduates includes knowledge and skills in the theory and technology of progressive processes in metallurgy and foundry production.