

**QUESTIONS INCLUDED IN THE ENTRY TEST FOR THE MASTER  
PROGRAM, YEAR 2020**

- Research methods in materials science: metallography and electron microscopy, X-ray diffraction; X-ray microanalysis, fractography and flaw detection and other physical methods;
- The mechanical properties of materials.
- Criteria of strength, ductility, viscosity, hardness and methods for their determination;
- The structure of solid and liquid metals.
- Melting and crystallization of pure metals, cooling curves.
- The dependence of the Gibbs volumetric energy of the liquid and solid phases in the system on temperature, and the degree of supercooling;
- Crystal growth mechanisms during crystallization of pure metals.
- Shapes of metal crystals.
- Dendritic growth, directions of dendritic growth.
- The role of defects in the crystal structure in the formation of a growing crystal;
- Solid state phase transformations.
- Polymorphism of metals (allotropic transformation).
- General laws of the development of phase transformations in the solid state.
- Diffusion and diffusion-free mechanisms of the development of phase transformation in the solid state.
- The form of crystals formed during the phase transformation in the solid state;
- Change in the structure and properties of metals during cold and hot deformation.
- The structure and properties of metals during heating, after cold working.
- Recrystallization.