

Name of the entrance exam
New Materials and Additive Technologies
Field/fields of study
22.04.01 Materials Science and Materials Technology
Educational program/programs
22.04.01_08 New materials and additive technologies
Abstract
<p>The program contains a list of topics (questions) on the disciplines of the core professional cycle of the bachelor's degree curriculum in the field of 22.03.01 Materials Science and Materials Technology, which are included in the content of the questions (test assignments) for the master's degree entrance examinations. The entrance examination is graded on a 100-point scale and consists of an interdisciplinary exam covering the requirements set by state educational standards for higher education for the level of bachelor's degree preparation in the corresponding master's degree program. The exam is administered in person in written form or remotely (maximum score: 100). The minimum score for successful completion is established by the Admission Rules approved for the current academic year.</p> <p>The exam duration is 120 minutes.</p> <p>Writing utensils, a draft, and a calculator are permitted during the entrance examination.</p>
Disciplines included in the program of entrance examinations for the Master's degree program
<p>Materials Science</p> <p>Powder and composite materials</p>
Content of academic disciplines
<p>Powder and composite materials</p> <ol style="list-style-type: none"> 1. Basic properties of metal powders. 2. Methods for obtaining metal powders. 3. Compaction of powder materials. Methods for forming powders. 4. Sintering of powder materials. 5. Quality control of products made from powders. 6. Gas-thermal coating methods. 7. Metal composite materials. 8. Basic methods for producing composite materials. 9. Strength of composite materials. 10. Nanopowders: preparation and properties. 11. Bulk nanostructured materials. <p>Key literature for studying the course:</p> <ol style="list-style-type: none"> 1. Composite Materials Engineering, Volume 1. / Xiao-Su Yi, Shanyi Du, Litong Zhang. - Springer Singapore, 09 February 2019 2. Composite materials - Handbooks, manuals, etc / Schwartz, Mel M. - New York : McGraw-Hill. 1984. PP 651. 3. Powder Technology Handbook, Fourth Edition / Ko Higashitani, Hisao Makino, Shuji Matsusaka <p>Materials Science</p> <ol style="list-style-type: none"> 1. Crystal structure of metals and alloys. 2. Diffusion processes in metal. 3. Plastic deformation of materials. 4. Mechanical properties of metals and alloys. 5. The influence of deformation and heating on the structure and properties of the metal. 6. Construction materials. 7. Theory and technology of heat treatment of steel. 8. Chemical-thermal treatment. 9. Classification of tribomaterials (anti-friction, friction and wear-resistant). 10. Nanostructure and its application. <p>Key literature for studying the course:</p> <ol style="list-style-type: none"> 1. Nanomaterials. An Introduction to Properties, Synthesis and Applications / Emmanuel Craig. – Larsen and Keller Education (7 Jun. 2019) 2. Fundamentals of Statistical and Thermal Physics / F.Reif. — Waveland Pr Inc; 56946th edition (December 30, 2009), PP. 651. 3. Foundations of Materials Science and Engineering 6th Edition / William Smith, Javad Hashemi. - McGraw-Hill Education, March 15, 2018

Entrance exam assessment criteria

There are 21 questions in the test, 20 of which are multiple-choice questions and 1 question requiring an extended answer.

Extended answers are worth 0 to 40 points.

A completely correct answer to a test question is worth 3 points.

Test Question Type by answer method are closed questions, in which the applicant must select one correct answer from a set of options;

Total points: 100

Assigned group

Chair of the Subject Examination Board:

Director of IMMiT A.A. Popovich

Compiled by:

Director of Higher School of Physics and Technology of Materials S.V. Ganin