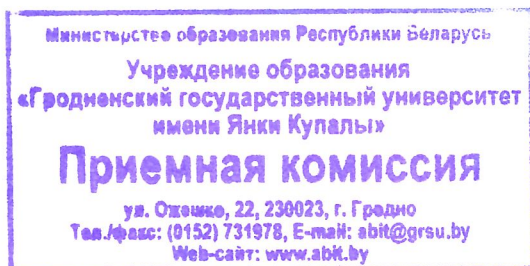


Education institution stamp



APPROVED

«05» 01 2016 г.

Chairman
of the Admissions Committee,
Rector of Yanka Kupala State
University of Grodno

I. Kiturka
(signature)

THE LIST OF TOPICS OF EDUCATIONAL DISCIPLINES

for an additional interview with applicants
from among foreign citizens and stateless persons,
temporarily staying or temporarily residing in the Republic of Belarus,
for obtaining advanced higher education in the specialty

7-06-0533-02 «Applied physics»

(English language of tuition)

Name of the educational discipline	The list of topics of the educational discipline
Physics	1. Linear momentum. The law of conservation of linear momentum. Energy as a universal measure of various forms of motion and interaction. Kinetic and potential energy of a mechanical system. Work by a variable force. Power. The law of conservation of mechanical energy. 2. Simple harmonic mechanical oscillator. Kinematic characteristics of harmonic oscillations. Differential equation of harmonic oscillations. Energy of harmonic oscillations. Free damped oscillators. Driven oscillators. 3. Basics of the Kinetic Molecular Theory (KMT) of ideal gases. KMT equation. The Mendeleev-Claapeyron equation. The average kinetic energy of molecules. Molecule degrees of freedom. The law of equipartition (equipartition theorem) on energy distribution of degrees of freedom of molecules. 4. The internal energy of an ideal gas. The work done during a change of ideal gas volume. Heat. Heat capacity. The first law of thermodynamics. The application of the first law of thermodynamics to isoprocesses and the adiabatic process of an ideal gas. The Carnot cycle. Efficiency of ideal gas Carnot cycle. The second law of thermodynamics. 5. Electrostatic field. The electrostatic field strength and potential. Principle of superposition for electrostatic field and potentials for the charge system. Relation of potential and electrostatic field. Gauss's law (theorem) for electric fields in a vacuum. 6. Direct current (DC). Current and current density. Electromotive force (EMF). Forces producing the EMF (third-party forces). Ohm's law for a homogeneous chain segment. Electrical resistance. Ohm's law for a complete chain. Kirchhoff's circuit laws. 7. The laws of geometrical optics. Thin lenses. Spherical mirrors. Light flow. Photometric quantities and their units.

	8. Coherence and monochromaticity of light waves. Time, length and radius of spatial coherence. Interference of light. Optical path difference. Conditions of interference minima and maxima. The Huygens-Fresnel principle. Fraunhofer diffraction on a single slit and on a diffraction grating. 9. Rutherford-Bohr model of the atom. Regularities in the spectrum of the hydrogen atom. Bohr's postulates. The Balmer-Rydberg formula. The hydrogen atom in quantum mechanics. 10. Radioactive nuclear transformations. Alpha, beta, gamma radiation, their nature and basic properties. The fundamental law of radioactive decay. Nuclear reactions. The fission of nuclei. Nuclear fission chain reaction. Thermonuclear fusion.
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