

На английском языке:

University	National University of Science and Technology MISIS
Level of English proficiency	A2
Educational program and field of the educational program for which the applicant will be accepted	03.06.01 Physics and Astronomy 1.3.6 Optics In the direction of "Development of methods for determining the spectral and morphological characteristics of blood cells" and "Development of experimental and theoretical approaches for determining the spectral characteristics of scattering-absorbing media"
List of research projects of the potential supervisor (participation/leadership)	Participation in the K7-2023-010 project within the framework of the Priority 2030 program
List of the topics offered for the prospective scientific research	1. Development of a methodology for determining the volume and morphological characteristics of human red blood cells. 2. Development of a method for determining the content of various types of hemoglobin in human red blood cells. 3. Theoretical and experimental study of the features of light scattering by spherical optically soft particles located on a flat substrate. 4. Determination of the spatial distribution of organic molecules in human red blood cells. 5. Development of a methodology for determining the leukocyte formula of human blood in the native state based on optical spectral digital microscopy methods. 6. Determination of spectral and color characteristics of nano-paint materials. 7. Determination of the optical spectral characteristics of bee honey.
 <p>Research supervisor: Igor V. Zabenkov, Candidate of Science/PhD, Saratov State University named after N.G. Chernyshevsky</p>	01.03.SY Optics, 01.03.UB Physics, Applied 01.03.UI Physics, Multidisciplinary
	Supervisor's research interests Identification, calculation, analysis of morphology, physiological parameters, as well as determination of the molecular composition of the shaped elements of human blood in the native state based on methods of optical spectral digital microscopy and the use of computer vision methods. Numerical simulation of light transport, absorption and scattering by optically soft particles. Modeling of the processes of light radiation transport through scattering-absorbing media in the multiple scattering approximation. Development and application of experimental and theoretical methods for solving direct and inverse spectral problems for scattering-absorbing media.
	Research highlights Work on unique equipment for the study of shaped blood elements; participation in NUST MISIS research projects and international RNF projects; The opportunity to gain a wide range of engineering skills in the field of optical system design, measurement automation; The opportunity to master software development methods for calculating the light fields of continuous and scattering-absorbing media, as well as image analysis.

	<p>Supervisor's specific requirements: The ability to use one or more common CAD modeling programs: Inventor, Freecad, AutoCAD. Knowledge of the basic course of physics, the laws of optics. Knowledge of the principles of optical research methods: microscopy, spectroscopy. Knowledge of programming skills in one or more of the popular languages: C, C++, Python, Pascal, Fortran.</p>
	<p>Supervisor's main publications</p> <ol style="list-style-type: none"> 1. Doubrovski V.A., Torbin S.O., Zabenkov I.V. Determination of Individual and Average Characteristics of Native Blood Erythrocytes by the Static Spectral Digital Microscopy Method // Optics and Spectroscopy. 2023. 131. № 9. pp. 803-814. doi: 10.1134/S0030400X23070044 2. Dubrovskii V.A., Zabenkov I.V., Torbin S.O., Karpocheva E.P. Identification and Counting of Erythrocytes of Native Human Donor Blood by Digital Optical Microscopy Using Spectral Filtered Illumination // Optics and Spectroscopy. 2021. pp. 315-328. doi: 10.1134/S0030400X21030073 3. Zabenkov I.V. The experience of attracting students to the development of a laboratory installation of a physical workshop // Physical education in universities. 2022. Vol. 28. No. 1. pp. 137-147. doi: 10.54965/16093143_2022_28_1_137 4. Dubrovsky V.A., Torbin S.O., Zabenkov I.V. Determination of the characteristics of erythrocytes of native blood by static digital spectral microscopy In the collection: Problems of optical physics and biophotonics SFM-2021. Materials of the 9th International Symposium and the 25th International Youth Scientific School Saratov Fall Meeting 2021. Saratov, 2021. pp. 8-24.
	<p>Results of intellectual activity</p>