	LEONENKO, Vasiliy N. Ph.D.
Research interests	✓ Mathematical modeling ✓ Epidemiology ✓ Methods of artificial intelligence in living systems
List of the supervisor's research projects (participation/supervision)	✓ Development of methods for minimizing uncertainty in modeling the dynamics of epidemic ARVI based on a set of models of variable structural complexity (leadership) ✓ Using mathematical modeling and machine learning methods together to reduce the damage from the COVID-19 epidemic(leadership) ✓ Development of methods for quantitative assessment of the relationship between the long-term dynamics of influenza incidence and the process of immunity formation in heterogeneous urban populations based on mathematical modeling (leadership)
List of potential thesis topics	✓ Using explainable artificial intelligence to predict COVID-19 incidence ✓ Analysis of the spread of influenza epidemics in the Russian Federation based on phylogenetic analysis of viral strains ✓ Using artificial intelligence and critical phenomena theory to predict anomalies in time series ✓ Contact network topologies and multi-agent propagation models
Publications in the last five years	18 (Scopus / Web of Science / RSCI)
Key publications	1. A. Korzin, V. Leonenko. Lightweight Models for Influenza and COVID-19 Prediction in Heterogeneous Populations: A Trade-Off Between Performance and Level of Detail // Mathematics volume 13, issue 9 – 2025. – P. 1385 – URL https://doi.org/10.3390/math13091385 2. I. Huaman, V. Leonenko. Does complex mean accurate: comparing COVID-19 propagation models with different structural complexity // Lecture Notes in Computer Science, volume 14075 – Cham : Springer Nature Switzerland, 2023. – P. 270-277. - URL https://doi.org/10.1007/978-3-031-36024-4_21 3. K. Sahatova, A. Kharlunin, I. Huaman, V. Leonenko. Accounting for data uncertainty in modeling acute respiratory infections: influenza in St. Petersburg as a case study // Lecture Notes in Computer Science, volume 14075 – Cham : Springer Nature Switzerland, 2023. – P. 286-299. – URL https://doi.org/10.1007/978-3-031-36024-4_23

	4. Y. Abramova, V. Leonenko. The Past Helps The Future: Coupling Differential Equations with Machine Learning Methods to Model Epidemic Outbreaks // Lecture Notes in Computer Science, volume 14835 – Cham : Springer Nature Switzerland, 2024. – P. 247-254. – URL https://doi.org/10.1007/978-3-031-63772-8_23 5. Leonenko V. N. et al. A Decision Support Framework for Periprosthetic Joint Infection Treatment: A Cost-Effectiveness Analysis Using Two Modeling Approaches //Journal of Personalized Medicine. – 2022. – Т. 12. – №. 8. – С. 1216. https://www.mdpi.com/2075-4426/12/8/1216 DOI: 10.3390/jpm12081216
Key IPs	✓ A software package of variable detail models for reproducing the dynamics of epidemic processes ✓ EpiHybrid modeling and forecasting software module ✓ A software package for individual-oriented modeling of disease outbreaks in Russian cities using models of optimal structural complexity
Supervisor's specific requirements	✓ Knowledge of applied mathematics and statistics ✓ Python programming skills ✓ Interest in multidisciplinary research in living systems (biology, epidemiology, bioinformatics)
Code of the subject area of the PhD program	1.2.1 Artificial Intelligence and Machine Learning 1.2.2 Mathematical Modeling, Numerical Methods and Software Complexes 2.3.1 System Analysis, Management and Information Processing 2.3.4 Management in Organizational Systems