Fondo Sociale Europeo Plus 2021/2027

FSE+

Sportello 2025 P.S. 20/24

Sostegno alla realizzazione di dottorati di ricerca

With Decree No. 9526/GRFVG of February 28, 2025, the Friuli Venezia Giulia Region published the Notice regarding the submission of operations for Specific Program No. 20/24, which aims to support higher education through the realization of PhD programs.

Specific Programme 20/24, through the funding of doctoral scholarships, contributes to the achievement of the objectives of the Sustainable Smart Specialisation Strategy (S4). It supports the development or strengthening of integration with the regional production system and/or research organisations, through coordination and collaboration mechanisms with regional enterprises or research bodies, or by leveraging the potential for technology transfer of processes, products, applications, or, more broadly, research outcomes.

- Sportello **2025**
- **Ciclo 41**
- CUP **J93C25000640008**
- Progetto **2025/6525/26**

Dottorato in **Applied Data Science and Artificial Intelligence**

“Deep Mitigating: leveraging hybrid AI-Math Models for the management of Pandemics and Epidemics"

The Project involves the development of Action Plans for the mitigation of epidemics and pandemics. These plans will be based on innovative behavioral epidemiology models, in which classical mathematical modeling will be integrated with advanced AI. In other words, AI will not only be used for prediction or simulation but will be integrated into the models to compensate for the description of subprocesses, such as the dynamics of human decisions, for which a complete and/or satisfactory theory does not exist. Furthermore, the adopted AI models will be important for discriminating between spontaneous behaviors and those induced by healthcare measures. Specifically, Neural Differential Equations and Universal Differential Equations will be used for descriptive/predictive modeling. For the fundamental part concerning the optimal design of epidemic/pandemic control, the paradigm of Physics-Informed Neural Networks will be adopted for the design of controls. They will also be employed for efficient simulation. Regarding the data, in addition to public data on COVID-19, we have data on other infectious diseases and social data useful for modeling human behavior. The research will be multidisciplinary, combining physical-mathematical modeling, AI, public health sciences and practice, and health economy. Particular attention will be given to the specificities of FVG. Prestigious international collaborations: the work will be carried out in collaboration with the Department of Mathematics at the University of Waterloo (Canada), the Institut National de Recherche en Informatique et en Automatique (Paris), and the Department of Economics at the University of Pisa. There will also be a collaboration with the Health Department of the Friuli Venezia Giulia Region. In fact, the mitigation of epidemics could have a strong regional impact: better prediction and control, reduction of healthcare costs, lower impact on the economic fabric, and greater preparedness for future emergencies.