European Social Fund Plus 2021/2027

FSE+

PPO 2023 S.P. 22/23

Support for higher education within the regional university

With Decree No. 17895/GRFVG of April 19, 2023, the Friuli Venezia Giulia Region published the Notice regarding the submission of operations for Specific Program No. 22/23, which aims to support higher education within the regional university system.

Line A – PhD Programmes

Specific Programme 22/23, 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.

- Notice **2024**
- **40th cycle**
- Unique Project Code (CUP) **J93C23001490008**
- Project **2024/1543/10**

Doctoral Programme in **Industrial and Information Engineering**

"Development of innovative meshless methodologies for the simulation and optimization of components and systems of industrial interest"

The objective of the project is the development, validation, and application of innovative numerical modeling methods for the design and optimization of industrial products, components, and systems. These methods include:

- Advanced numerical techniques, such as meshless methods which, unlike traditional mesh-based methods (Finite Element, Finite Volume), do not require a supporting mesh/grid or associated connectivity. This allows for greater flexibility and robustness in automatically addressing problems with high geometric complexity.

- Reduced Order Models (ROMs) derived from data-driven methodologies based on Machine Learning, including Physics-Informed Neural Networks (PINNs). The integration of these techniques with meshless methods and optimization algorithms will enable the creation of a system capable of simulating and optimizing products/systems from the early design stages.

For these developments, modern software engineering techniques will be adopted, along with advanced programming languages such as Julia, and high-performance computing infrastructures (HPC – High Performance Computing and GPU – Graphical Processing Units).

The research outcomes will be of interest to regional companies involved in the development of product design software, making the technological transfer of the developed prototypes both feasible and beneficial.