1. **Training Title**: Doctoral Training in Automation
2. **Language of Instruction**: French / English
3. **General Program Description**: The doctoral training in Automation aims to deepen theoretical and applied knowledge in the fields of control, modeling, and optimization of dynamic systems. It prepares doctoral students for careers in scientific research, higher education, and industry by providing them with advanced tools for the analysis and design of automated systems. Specific objectives include:
   • Mastery of modern control approaches and artificial intelligence applied to automation.
   • Development of skills in modeling and simulation of complex systems.
   • Integration of new technologies into control and supervision systems.
4. **Main Courses**:

Research methodology courses - Introduction to didactics and pedagogy courses - ICT courses - Foreign language proficiency enhancement courses
• The courses offered are part of the teaching load of research faculty members.
• The course hours for knowledge enhancement are set at two (02) hours per week.
These courses can be organized by specialization or grouped by field.
• ICT, research methodology, and pedagogy courses may be shared among the different fields.
• The doctoral student's portfolio is mandatory for validating acquired knowledge and monitoring the doctoral candidate, and it will be introduced into the PROGRES digital platform.

5. **Admission Information**: Admission to the program is governed by Order No. 991 of August 1, 2022. Eligibility criteria and the selection process are defined in articles 4, 5, 6, 7, and 8 of this order.
6. **Core Courses**:

Artificial Intelligence, Advanced Control Techniques, Metaheuristic & Bio-inspired Algorithms, Electronics of Embedded Systems.

7. **Advanced Topics**: The training allows for further specialization in several fields, including:
   • Cyber-physical systems and embedded control
   • Optimization of automated system performance
   • Applications of bio-inspired algorithms in automation
   • Energy management in automated systems

8. **Affiliated Laboratory**: Signal, System, and Artificial Intelligence Laboratory (2SAIL). Link to 2SAIL
9. **Research Teams**:

- **Team 1: "Optimization of Performance and Process Monitoring"**

This team works on creating robust dynamic models and integrating intelligent sensors to minimize the use of expensive and hard-to-maintain sensors. Artificial intelligence, through learning algorithms and logical reasoning, improves the detection and diagnosis of anomalies without disrupting the normal operation of systems. Research in this area aims to develop solutions for the monitoring and diagnostics of systems, using robust methods such as observers to address measurement flaws, modeling errors, and environmental disturbances. Intelligent control also enhances system reliability by using high-precision sensors and integrating fault-tolerant control strategies (FTC) and fault detection and isolation (FDI) methods.

- **Team 2: "Control, Robotics, and Artificial Intelligence" (CORIA)**

The primary mission of the "Control, Robotics, and Artificial Intelligence" (CORIA) team is to develop hardware and software platforms to address the control issues of dynamic systems in a wide range of sectors such as industry, medical, environmental, and other socio-economic fields. The main objective of the research conducted by the CORIA team is to propose modern and effective solutions to meet the specific challenges of complex dynamic systems, which are often nonlinear, underactuated, multivariable, and strongly coupled. In parallel, research also focuses on optimizing teleoperation, supervision, and robotics, integrating artificial intelligence and machine learning to improve system efficiency.

- **Team 3: "Power Electronics and Hybrid Systems with New and Renewable Energy"**

The members of Team 3 specialize in power electronics, with a particular focus on modeling, control, simulation, and experimental validation of static converters. They also focus on the advanced management and control of hybrid systems with new and renewable energy (SENR). The main objective of this team is to develop intelligent, efficient, and robust control methods for the autonomous and grid-connected operation of collaborative SENR systems, integrating hybrid energy storage systems (SSEH).