



# PhD in INGEGNERIA GESTIONALE / MANAGEMENT ENGINEERING - 39th cycle

**THEMATIC Research Field: INDUSTRIAL ERGONOMICS AND HUMAN FACTORS: A COMPREHENSIVE APPROACH TO THE DESIGN AND MANAGEMENT OF HUMAN-CENTERED DIGITAL FACTORIES**

<b>Monthly net income of PhDscholarship (max 36 months)</b>
<b>€ 1450.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

<b>Context of the research activity</b>	
<b>Motivation and objectives of the research in this field</b>	<p>Industry 5.0 represents the next evolution of the industry, where humans and machines work together in a more collaborative and integrated manner. In this context, it is essential to understand the impact of human factors and the contribution of cognitive ergonomics on the design and implementation of sustainable human-centered production systems.</p> <p>There is a strong agreement about the potential benefits from the integration of human factors and cognitive ergonomics disciplines in designing and managing such production systems: overall, this integration would concurrently increase the health and safety conditions, the overall quality of work and wellbeing, still preserving or increasing the efficiency of the production systems, reducing errors and downtime.</p> <p>While production systems are rapidly evolving into fully integrated cyber-physical systems, industrial ergonomics and Human Factors bodies of knowledge still address the different dimensions of work systems, namely physical arrangements vs. cognitive and sociological aspects, as if they were independent.</p> <p>The objective of this research is to move a step forward in producing reference models, design and management methodologies, and operational solutions for improved physical and cognitive well-being of operators and a human-centered digital factory. The specific contexts of interest will include for example collaborative</p>



	<p>manufacturing cells (cobots, AGVs), semi-automated operations with high cognitive content (quality control, supervision of CPS or transport platforms), and remote supervision of safety-critical production systems or transport processes (e.g., automated manufacturing, drone steering, autonomous driving supervision).</p> <p>The research is funded by the "HumanTech - Humans and Technology" project. The HumanTech project has been selected and funded by the Ministry of University and Research (MUR) for the period 2023-2027 within "Dipartimenti di Eccellenza" (Law 232/2016), the ministerial initiative aimed at rewarding the departments that stand out for the quality of their research and at financing specific development projects.</p>
<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The research will require (and/or develop) a deep knowledge in empirical (both qualitative and quantitative) and experimental research methodologies. The adopted methodologies will stem from a set of different disciplines, such as management engineering, biomedical engineering, mathematics and statistics, and occupational medicine.</p> <p>In line with the HumanTech Project, three brand new Labs will be arranged in 2023-24, that will enable and support this research. Among the three Labs, the one in Cognitive Ergonomics in Cyber-Physical Systems will be the reference one.</p> <p>In addition, this research will be carried out in collaboration with the Human Factors in Safety and Sustainability research Group of the Technological University Dublin, that already has a Lab and a tradition in Human Factors in Safety &amp; Sustainability. Leveraging on this collaboration, the visiting period of the candidate will take place in Dublin, Ireland, at the Technological University Dublin.</p>
<p><b>Educational objectives</b></p>	<p>The research is multidisciplinary in nature: the candidate will develop advanced research skills in the areas of human factors, cognitive ergonomics, occupational health,</p>



	industrial work organization, and management. She/he will learn how to design and conduct a research project, adopting the proper methodologies for data collection and analysis, and to present and publish results in both academic/scientific and managerial outlets. An intense work in Laboratories is a key ingredient of the project.
<b>Job opportunities</b>	The successful completion of the program will open several job opportunities in both academia and companies, organizations of different nature, in research, consulting and managerial roles.
<b>Composition of the research group</b>	2 Full Professors 3 Associated Professors 0 Assistant Professors 5 PhD Students
<b>Name of the research directors</b>	Guido Micheli and Maria Chiara Leva

<b>Contacts</b>
guido.micheli@polimi.it

<b>Additional support - Financial aid per PhD student per year (gross amount)</b>	
<b>Housing - Foreign Students</b>	--
<b>Housing - Out-of-town residents (more than 80Km out of Milano)</b>	--

<b>Scholarship Increase for a period abroad</b>	
<b>Amount monthly</b>	725.0 €
<b>By number of months</b>	0

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
The candidate will be based at the Department of Management, Economics and Industrial Engineering and attend the PhD Courses and all the educational activities of the PhD Program in Management Engineering, in a joint agreement with the partner institution (TUD). She/he will be granted a research budget for notebook, travels, conferences, as per the PhD Program regulations