



# PhD in ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO / ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING - 40th cycle

**PNRR 630 Research Field: DEVELOPMENT OF PREDICTIVE MODELS FOR THE AUTOMATION OF THE ENERGY MANAGEMENT OF BUILDINGS**

Monthly net income of PhDscholarship (max 36 months)
<b>€ 1400.0</b>
In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity	
<p><b>Motivation and objectives of the research in this field</b></p>	<p>The research aims to ensure the correct management of the building and the efficiency of the systems following the commissioning. The doctoral research will focus on maintaining energy performance and reducing consumption over time. Special attention will be given to the life cycle of the system and the energy consumption of the building. It will define automation methods based on artificial intelligence logic applied to the systems and building automation. The objectives of the research in this field are to identify best practices for achieving sustainable buildings through improved energy efficiency, green building rating systems, policies, technology utilization, and strategies. Additionally, the research seeks to explore the challenges associated with energy efficiency and provide recommendations and pathways for future work in the field. The motivations include limiting energy use, reducing environmental, economic, and social impacts, and contributing to sustainable development by addressing energy efficiency in buildings. This research will serve as a valuable reference for stakeholders, governments, and decision-makers, providing insights for future researchers and attracting further research endeavours in the field.</p>



<p><b>Methods and techniques that will be developed and used to carry out the research</b></p>	<p>The research will employ a combination of methods and techniques to achieve its objectives. Initially, a comprehensive literature review will be conducted to understand the existing knowledge and identify gaps in the field of energy performance and building automation. This will be followed by data collection from real-world buildings to analyze their energy consumption patterns and performance. One key technique that will be developed and utilized is the implementation of sensor technologies to monitor and collect real-time data on energy usage within the building. Machine learning algorithms will be applied to analyze this data and identify patterns that can lead to improved energy efficiency. Furthermore, the research will explore advanced control strategies for building automation systems, leveraging artificial intelligence and predictive control algorithms. This approach will enable the automation of energy management processes and the optimization of system performance based on real-time data and user preferences. Overall, the research will employ a multi-disciplinary approach, combining engineering principles, data analytics, and advanced technology to develop innovative methods and techniques for enhancing energy performance and reducing energy consumption in buildings. The 6-month internship will be carried out at Tekser s.r.l. while the location for the 6 months abroad will be decided on.</p>
<p><b>Educational objectives</b></p>	<p>The educational objectives of the research are to provide insights into sustainable building practices, energy efficiency technologies, and advanced control strategies. The candidate could effectively pursue advanced research skills following the updating of the relevant topics developed in the frame of the associations:                  AICARR (Associazione Italiana Condizionamento dell'Aria Riscaldamento e Refrigerazione) <a href="https://www.aicarr.org/Default_en.aspx">https://www.aicarr.org/Default_en.aspx</a>                  REHVA (Federation of European Heating, Ventilation and Air Conditioning associations) <a href="https://www.rehva.eu/">https://www.rehva.eu/</a></p>



<b>Job opportunities</b>	<p>Building Energy Manager: Responsible for overseeing the correct management of building systems to ensure energy efficiency and performance over time.</p> <p>Sustainability Consultant: Specializing in advising on sustainable building practices, green rating systems, and energy efficiency technologies.</p> <p>Automation Engineer: Designing and implementing automation methods.</p>
<b>Composition of the research group</b>	<p>2 Full Professors            5 Associated Professors            3 Assistant Professors            7 PhD Students</p>
<b>Name of the research directors</b>	Simone Ferrari

<b>Contacts</b>	
email:	<i>simone.ferrari@polimi.it</i>

<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>	700.0 €
<b>By number of months</b>	6

<b>National Operational Program for Research and Innovation</b>	
<b>Company where the candidate will attend the stage (name and brief description)</b>	TEKSER s.r.l.
<b>By number of months at the company</b>	6
<b>Institution or company where the candidate will spend the period abroad (name and brief description)</b>	to be decided
<b>By number of months abroad</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>	
<b>Additional support:</b>	
<b>Budget for the research activity (only for positions supported by scholarship):</b>	
total amount Euro 5707.20 per student	
In detail:	



- 1st year Euro 1902.40
- 2nd year Euro 1902.40
- 3rd year Euro 1902.40

**Additional information about the organization and regulations of ABC-PhD programme can be found in the Regulations for the 40th Cycle of ABC-PhD:**

download is available at link:

<https://www.dottorato.polimi.it/corsi-di-dottorato/architettura/architettura-ingegneria-delle-costruzioni-e-ambiente-costruito>

**Additional information about ABC department and ABC-PhD programme:**

available at link:

<https://www.dabc.polimi.it/>

**Desk availability:**

The ABC department provides non-permanent desks to be temporarily booked in common PhD rooms.