



PhD in ARCHITETTURA, INGEGNERIA DELLE COSTRUZIONI E AMBIENTE COSTRUITO / ARCHITECTURE, BUILT ENVIRONMENT AND CONSTRUCTION ENGINEERING - 39th cycle

THEMATIC Research Field: TECHNOLOGY DRIVING INNOVATIONS TOWARDS A KNOWLEDGE-BASED BUILDING INDUSTRY AND PROCESS.

Monthly net income of PhDscholarship (max 36 months)

€ 1275.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

The aim of this research area is the identification of innovative paths in the field of planning, design, project, production and management of architecture and built environment. This area can be declined in the definition of technological and technical innovation dynamics at different levels: organizational models of the construction supply chain, processes, information technology for the project and management of assets, information systems for the real estate management, organizational models for real estate management, Facility Management services, construction solutions, advanced industrial systems, production processes of advanced materials and smart materials. This area can be defined by technologies, design strategies, innovative process models and evaluation methods for the innovation of materials, products, processes, in particular:

Hard technology driving innovation: Development of innovative technologies and systemic approaches for territorial systems, smart cities, buildings, constructive systems and materials (e.g. additive manufacturing/3D printing, off-site and disassemblable construction systems, techno-typological and building models, adaptive habitats).



	<p><u>Soft technology driving innovation:</u> Development of innovative technologies and systemic approaches for a smart process of planning, design, building and management (e.g. Building Information Modelling BIM, Data-Driven Design, Internet of Things IoT, Digital twins, parametric design), managing digital technologies and big data along the value chain, including facility management.</p> <p><u>Knowledge-based building industry and process:</u> Development of new skill and competencies, with interdisciplinary capacity.</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The research is based on a first phase of basic curiosity driven exploration, which can then develop towards an applicative and experimental research. The research is carried out by developing knowledge aimed at establishing cultural awareness and technical competence aimed at governing the complexity of the transformation processes of the built environment, considering both the intangible level (information and data management) and the material level (materials and construction solutions). Research and innovation activities must respond and give active support to the development of an evolutive framework that is shaped by societal challenges, by policy and regulatory drivers and by technology and industry trends, that might either be considered as challenges or opportunities.</p> <p>SDGs related to this research:</p> <ul style="list-style-type: none"> •Goal 9 "Industry, innovation and infrastructure" and "Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation" •Goal 11 "Sustainable cities and communities" and "Make cities and human settlements inclusive, safe, resilient and sustainable" •Goal 12 "Responsible Production and Consumption" and "Ensure sustainable consumption and production patterns"



Educational objectives	<p>ABC-PhD Candidates are expected to produce knowledge advancements in their scientific field. Moreover, they are raised to be resilient, not frightened by the uncertainty and failure risks of innovations, trained in communication, management, networking and other transferrable skills, that are fundamental for doing research in this complex world.</p> <p>They are taught to cooperate in a competitive environment and to exploit their creativity to reach their goal, going beyond the limits of one scientific discipline, interacting and learning from other researchers and colleagues. Eventually, they are pushed to find out (and to network with) the possible stakeholders of their work. We purport that the best value for the Candidate and for the Program itself is the reward given by the chance of a practical application of the knowledge advancements realized.</p> <p>With this experience, ABC-PhD Doctors are expected to acquire the capacity to shoulder the responsibilities of R&D activities, to plan and to manage control tasks, to help the development and the critical optimization of policies and projects, to innovate: in particular about the PhD thesis topic, in general about the many sectors of Architecture, Built Environment and Construction Engineering and in all the most critical subjects related to the sustainable transformation and management of the Built Environment (environmental, economic, social and cultural sustainability).</p>
Job opportunities	<p>The holder of an ABC-PhD will gain high-level scientific knowledge, significant experience and proven R&D management skills, transferrable to other activities. This, together with the habit of communicating and working in English, acquired interacting with colleague at a global scale, during visits and stays abroad, and a deep knowledge of the academic world qualifies the Doctorate for positions offered by the best international universities and research centres.</p> <p>ABC-PhD experience, nevertheless, will offer the best occupational opportunities also for employments in</p>



	<p>architectural and engineering design enterprises, in public bodies and wherever highly qualified personnel (at an international level), specific competencies at the highest level, the attitudes and the network of a researcher is acknowledged.</p> <p>The more the Candidate, during the three PhD years, has taken the opportunities to stay in touch with the stakeholders of actual (or future!) societal needs and to operate real knowledge transfer, the more this comes true.</p> <p>ABC-PhD holders, in fact, are problem-setters, trained to model complex environments, to understand complex questions and to apply critical thinking, and problem solvers, trained to turn uncertainty in methodology and doubts in reliable solutions. The proposal has an innovative and strategic value with respect to the research and innovation paths outlined by the ECTP - European Construction Technology Platform and the EU funding program for research and innovation.</p> <p>The added value potentially associated with the proposed research and the expected impact in terms of innovation, scientific production and social impact derive from the close relationship with the industry 4.0 and digital transition underway at European level.</p>
Composition of the research group	<p>8 Full Professors 10 Associated Professors 6 Assistant Professors 10 PhD Students</p>
Name of the research directors	E.Ginelli, E.Faroldi, I.Paoletti, C. Talamo

Contacts
<p>Prof. Oscar Eugenio Bellini email: oscar.bellini@polimi.it</p>

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

Scholarship Increase for a period abroad



Amount monthly	637.5 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Additional support:

Budget for the research activity (only for positions supported by scholarship): total amount Euro 5197.60 per student.

In detail:

- 1st year Euro 1732.53
- 2nd year Euro 1732.53
- 3rd year Euro 1732.53

Additional information about the organization and regulations of ABC-PhD programme can be found in the Regulations for the 39th Cycle of ABC-PhD: download is available at link: <https://www.dottorato.polimi.it/corsi-di-dottorato/architettura/architettura-ingegneria-dellecostruzioni-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.