



PhD in CHIMICA INDUSTRIALE E INGEGNERIA

CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 38th cycle

PARTENARIATO PNRR Research Field: ENGINEERING, PROCUREMENT, CONSTRUCTION, AND OPERATIONS OF BIOGAS-TO-BIOMETHANOL MINIPANT

Monthly net income of PhDscholarship (max 36 months)
€ 1325.0
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	<p>ECS-MUSA ECOSISTEMA DELL'INNOVAZIONE MUSA - MULTILAYERED URBAN SUSTAINABILITY ACTION CUP: D43C22001410007 (D.D. 1055 del 23/06/2022)</p>
	<p>As a chemical engineer the candidate is expected to help in the development of control and operation strategies for new chemical processes. The focus of the activity will be in developing effective strategies for the operation and control of new technologies as well as the start-up and shut-down procedures development and validation. This step is necessary to license any technology and is part of the technological package sold with each industrial scale unit operation and process.</p> <p>In particular, in recent years, thanks to the activity of the Technology Transfer Office, the Politecnico has provided researchers and students with specific tools and support for the economical exploitation of scientific results, through the protection of Intellectual Property, the licensing of patents, and the creation of spin-off companies. However, the technological maturation of very promising ideas, is unavoidably undermined by the university's reduced financial capability and limited industrial outreach. Industrial level pilot plants are needed to carry out the validations required by companies.</p> <p>The PhD project will aim to reinforce the core activities of the TTO by improving the screening of technology transfer</p>



	<p>opportunities in the chemical engineering sector and support the realisation of an innovative infrastructure to upscaling the most relevant research projects. Given the above points the intended objective of the project and main task of the candidates will thus be develop safe and effective operation procedures to help in the upscaling of new technologies and their future industrial application. Regarding the areas of intervention of the National Recovery and Resilience Plan (PNRR), the project proposal meets the programmatic directions of some of the main horizontal pillars of the PNRR-Next Generation Italy, and in particular the issue of "Deep Tech: Entrepreneurship & Technology Transfer" in the MUSA project (Multilayered Urban Sustainability Action).</p>
<p>Methods and techniques that will be developed and used to carry out the research</p>	<p>The research shall be conducted as a sequence of descriptive and prescriptive studies that could be adapted based on the specific gaps and findings that will emerge along the development of the activities</p> <p>The research project is divided into the following milestones:</p> <ol style="list-style-type: none"> 1. Extensive review of state-of-the-art competing technologies and relevant scientific and intellectual property work on current operation procedures 2. Development of phenomenological and statistical models relevant to the specific technology 3. Development of control schemes and strategies for optimal start-up, shutdown and operations of new processes 4. Operation of a demo-scale to validate the previous work <p>During all these steps the Ph.D. candidate will work closely in collaboration with both the Technology transfer Manager and the DCMC research groups.</p>
<p>Educational objectives</p>	<p>The educational objective of the research is to train the candidate to contextualize technical knowledge in the Intellectual Property legal framework. In turn, this involves the development of skills in system modelling, functional modelling, information extraction from structured</p>



	documents, development of said documentation and pattern recognition in innovation dynamics, trend analysis and trend extrapolation.
Job opportunities	Job and career opportunities include professional outlets in all sectors, both public and private, related to technology transfer, business development, and R&D. For example: Technology Transfer Manager, Business Development Engineer, Process & Technology Transfer Engineer, R&D Engineer. The PhD experience also prepares for a research career in academia or research centers.
Composition of the research group	1 Full Professors 1 Associated Professors 1 Assistant Professors 0 PhD Students
Name of the research directors	Prof. Flavio Manenti

Contacts
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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	662.5 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p><u>Educational activities</u> (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year:</p> <p>1st year: about 1.800 euro 2nd year: about 1.800 euro 3rd year: about 1.800 euro</p> <p><u>Teaching assistantship</u>: Availability of funding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching</p>



practice.

The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.