



# PhD in CHIMICA INDUSTRIALE E INGEGNERIA

## CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 39th cycle

Number of scholarship offered	3
Department	DIPARTIMENTO DI CHIMICA, MATERIALI E INGEGNERIA CHIMICA "GIULIO NATTA"

### Description of the PhD Programme

*The study of basic disciplines is seen as a necessary tool for the rationalization of technologies and of their rational, safe and sustainable use. The training objective is not only trivially to provide the students with tools for the understanding, planning and managing processes and systems, but also to enable them to independently develop new technological applications and to design and to characterize new products and new services with these characteristics. The qualification of a PhD student is accomplished through the an original research work on a specific topic of the Industrial Chemistry and Chemical Engineering PhD. As an example, such specific topics may include:*

- the chemistry of natural compounds;*
- the development of innovative chemical processes;*
- food safety and quality assurance;*
- advanced materials;*
- human health;*
- innovative energy technologies, with particular attention to energy consumption;*
- the development of combustion processes with low environmental impact, including the internal combustion engines;*
- the methodologies and criteria for process and plant design and operation, considering the choice of raw materials, the cost of the process, safety issues and sustainability;*
- the design and control of operation units and of the whole plant through mathematical modeling and computer simulation techniques;*
- the study of processes at the microscopic scale, deepening the thermodynamics and kinetics and using other tools from electrochemistry and materials science;*
- the study of electrochemical processes in an interdisciplinary and multidisciplinary approach which involves the chemical and metallurgic engineering, material engineering and energetics; the synthesis, characterization, process technology, and use of substances; the design based on the structures*





# PhD in CHIMICA INDUSTRIALE E INGEGNERIA CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 39th cycle

**OPEN SUBJECT Research Field: CATALYSIS FOR ENERGY AND ENVIRONMENTAL APPLICATIONS**

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	
<b>Motivation and objectives of the research in this field</b>	To study and develop innovative catalysts and catalytic processes for energy-related and environmental applications
<b>Methods and techniques that will be developed and used to carry out the research</b>	Testing of catalysts under laboratory conditions. Kinetics analysis and study of reaction mechanism. Analysis of the role of heat and mass transfer phenomena. Mathematical modelling of catalytic reactors
<b>Educational objectives</b>	To gain a high-level knowledge about catalytic processes for energy applications and environmental protection
<b>Job opportunities</b>	Chemical industries, energy companies, developers and users of energy conversion technologies, catalyst manufacturers, car manufacturers
<b>Composition of the research group</b>	7 Full Professors 3 Associated Professors 2 Assistant Professors 15 PhD Students
<b>Name of the research directors</b>	Tronconi, Lietti, Groppi, Beretta, Maestri, Nova

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	700.0 €
By number of months	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information
<p><u>Educational activities</u> : financial aid per PhD student is available for purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences:                      1st year: max 1900 euros per student                      2nd year: max 1900 euros per student                      3rd year: max 1900 euros per student</p> <p><u>Teaching assistantship:</u>                      availability of founding in recognition of supporting teaching activities by the PhD student. There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</p>



# PhD in CHIMICA INDUSTRIALE E INGEGNERIA

## CHIMICA / INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING - 39th cycle

**OPEN SUBJECT Research Field: INDUSTRIAL CHEMISTRY AND CHEMICAL ENGINEERING**

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	
<b>Motivation and objectives of the research in this field</b>	Topics: 1. methods and criteria for industrial processes and plants design and operation, including safety and environmental aspects; 2. industrial plant design and control by computer-based mathematical modeling and simulation methods; 3. microscopic-scale analysis of industrial processes through thermodynamics, kinetics and transport phenomena methodologies; 4. synthesis, characterization, transformation technology and application of substances; 5. design of chemical and/or biological material; 6. characterization of products and materials.
<b>Methods and techniques that will be developed and used to carry out the research</b>	The research will be carried out using both experimental and computational facilities. Laboratory-scale apparatus data will be interpreted by suitable mathematical models implemented in computer codes. The use of advanced analytical devices and literature survey will be an essential part of the work.
<b>Educational objectives</b>	The main objective is to give to the student the tools to design and manage chemical synthesis, chemical processes and industrial plants, and to allow him/her to develop in a self-sufficient way new technological applications and to create and characterize new products and services.
<b>Job opportunities</b>	



	The Research Doctors will be able to find a natural location in process companies and both in private and public companies and institutes, operating in the field of research, design, production, formation, control and consultant services.
<b>Composition of the research group</b>	14 Full Professors 33 Associated Professors 6 Assistant Professors 61 PhD Students
<b>Name of the research directors</b>	Carlo Alessandro Cavallotti

<b>Contacts</b>	
carlo.cavallotti@polimi.it (+ 39 022399.3176) www.chem.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>	700.0 €
<b>By number of months</b>	6

<b>Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information</b>
<p><i>Web site: <a href="http://phd.chem.polimi.it/">http://phd.chem.polimi.it/</a></i></p> <p><i>Educational activities (purchase of study books and material, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student:</i></p> <p><i>1st year: max 1.900 euro</i></p> <p><i>2nd year: max 1.900 euro</i></p> <p><i>3rd year: max 1.900 euro</i></p> <p><i>Teaching assistantship: availability of funding in recognition of supporting teaching activities by the PhD student.</i></p> <p><i>There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.</i></p> <p><i>Computer and desk availability</i></p>